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EDITORIAL NOTES.

Municipal Gas-Making, Brick-Laying, and other Matters.

THE burning question as to the municipalization of public supply undertakings has, it seems, descended far from the High Court of Parliament—Mr. R. B. Suthers having just issued, from the "Clarion Press," an appeal on this subject to that much-cited source of practical wisdom in the conduct of affairs, "The Man in the Street." This puissant personage has hitherto distinguished himself by systematically neglecting his duties and ignoring his opportunities as "a "member of a municipality, an owner of property, a land-"lord, a capitalist, and an employer of labour." A negro preacher once told his congregation that they could easily see what the Almighty thought of riches, by the kind of people to whom He gave them. Similarly, it might be said that the degree of estimation in which the Man in the Street holds his municipal responsibilities, may be appreciated by the kind of parish politician whom he permits to mismanage his municipal affairs, while he is more agreeably occupied. Mr. Suthers appears to think that this is the sort of gentleman who will pay 6d. for a pamphlet setting out the joys of the citizen of Glasgow, fast being municipally tended from his cradle to his grave, or how the ratepayer of Manchester is interested in the Ship Canal, or how many gas-works are owned by local authorities up and down the country. It is to be feared the author's hopes will suffer disappointment. The Man in the Street really does not care sixpence for any of these things.

Nor is there any valid reason why he should trouble himself about them. The Government of the country is carried on by representatives of the people, not by a system of delegation. It is for the duly elected and appointed representatives of the people to initiate reforms and decide what is best, in their judgment, for their constituencies. Occasionally, when the popular mind does intermeddle in these matters, as recently in Birmingham, the best laid municipal plans are apt to be upset. The truth of the matter is, as even the most ardent of municipalizers must discover sooner or later, that the cause of efficiency in the administration of local affairs is not to be served by professing general principles. These matters must be dealt with on the only sound basis there is, which is that of expediency. This means that every case must be treated on its merits. Take the one instance of municipal gas supply. How is it the statistics of municipal gas manufacture look so favourable to the "principle" as they do? Was it because the dominant party in municipal politics everywhere adopted the "principle" of municipalization of this service, and thereupon proceeded to carry it out at the first convenient opportunity, regardless of circumstances? That is what one would understand by acting upon a principle. The facts, however, are of another colour. What was done was that, as opportunity served, certain gas undertakings that could be acquired by the local authorities on favourable terms were so acquired, by the sanction of Parliament. It is not wonderful that the collective results of the working of these undertakings possess a certain character. The addition of any number of positive quantities is a positive quantity. The true interpretation to be put upon this evidence is, that the wisdom of Parliament and the enterprise of those local authorities who knew how to take occasion by the hand, has been fairly justified by experience. But your professed Municipalizer puts the cart before the horse. He uses the collective result of a number of examples of the sound exercise of judgment as proof of the existence and validity of a "principle." It is obviously nothing of the kind. If there are 232 municipal gas-works in the United Kingdom, as Mr. Suthers has discovered, which, taken all in all, do credit to their municipal administration, we would undertake to match them with an equal number of very similar undertakings under company control which it would not pay to municipalize on the only possible terms. Then what becomes of the "principle"? If, to come to close quarters, it is a good stroke of business to municipalize the Devonport gas undertaking, why are the Leamington Corporation in Parliament for permission to abandon their statutory powers to require the local Gas Company to sell their undertaking?

Your local politician will never see things as they are, so long as he continues to wilfully bind his eyes with an opaque "principle." A lamentable instance of this blindness on the part of people who will not see, is afforded by the action of the London County Council in regard to the work of their Trade Union bricklayers. Here Lord Carrington, who, one supposes, ranks himself with the party that professes the cult of "efficiency," turns his back upon every proof as to the scandalous inefficiency of the Works Department of the Council, with the declaration that he must "defend the principle of the direct employment of labour"—seemingly, whether the results are good or bad. When the consideration of the evasive report of the Finance Committee on the amount of work done for a day's pay by the Council's bricklayers was no longer to be avoided, some 87 of these faithful custodians of the interests of the ratepayers of London voted in favour of it, against 26 dissentients. There is "principle" here, undoubtedly; but it is the well-known principle of the historical personage who "always voted at his party's call, and never thought of "thinking for himself at all." Sir Joseph Porter, K.C.B., was a Progressive without knowing it.

It was very humorous of Mr. Alderman Taylor to abuse the scribblers of "The Times" for writing on subjects of which they know nothing, while carefully refraining from denying the substantial accuracy of the statement in question—that the tale of bricks laid by a County Council bricklayer is 330 per day. Evidently, chairmen of joint-stock companies are not singular in avoiding or fencing with inconvenient truths. A Trade Union leader has to be adept at the same game. Meanwhile, the precise information as to what is a fair day's work of bricklaying, which nobody on the London County Council is able to ascertain, was disclosed in "The Times" in a very interesting account of the construction of the Westinghouse factory in Manchester. This, of course, is where the Westinghouse gas-engines are to be made, and employed. Mr. J. C. Stewart, the Building Manager of the Company, has got an average of 1400 bricks per day per man out of his English bricklayers; but this was for heavy work practically in grout. It must have been pretty much the same as the "navvy brickwork" known to railway contractors, in which a barrowful of bricks can be slapped into place almost at a blow. What can be done on house walls not exceeding 14 inches thick, is stated by a communication vouched for by the "London Argus," to the effect that on a suburban building estate four men are actually laying stock bricks at the rate of 4300 a day, from the scaffold, in lime mortar. Again, what is the value of the principle of direct employment, on the showing of this particular case?

The Midland Association and their President.

BY his many natural gifts as an Engineer, and by the exercise of those gifts in connection with the Birmingham Corporation Gas-Works and elsewhere, Mr. Charles Hunt has, without aid, created for himself the distinguished position of leader among his professional *confrères* of the Midlands. Therefore it is not surprising that the union of circumstance which marks this year for Midland gas engineers should have produced a desire to see Mr. Hunt once more taking his rightful position at the head of the home organization. By the efflux of time, this is likely to be the last complete year of Mr. Hunt's service as the Engineer of the Windsor Street Gas-Works of the Birmingham Corporation; and it is also the year which witnesses the ending of the first quarter-of-a-century's work of the Midland Association, in which Mr. Hunt has taken so prominent a part. Such a year for Midland gas engineers could not be allowed to pass without recognition; and so last Thursday, Mr. Hunt once

more stepped into the presidential seat, which he has before occupied with honour to himself and to the Association.

In his time, Mr. Hunt has delivered many presidential addresses; but never before has he penned a more brilliant one than that to which he treated the Midland members on Thursday. His suggestion that it may be his last, we turn aside. We sincerely hope—and the hope is but the echo of the feeling of the profession generally—that it will not be; not merely for the sake of obtaining more of the intellectual product of his brain, but because it is not the will of the profession that he shall yet silently slip from that front rank which he has so long adorned. We have, however, to-day to deal with the address before us. The only reason one can find for its greater brilliance over the predecessors from his pen is the fact that a greater and more varied number of subjects than before present themselves to the search-light of the comprehensive mind of a man given to penetrating all that comes before him pertaining to his life's work. To be able to comprehend and to penetrate to the very soul such a variety of matters as Mr. Hunt dealt with in his address, is indeed a gift; and of the fruits of that gift the profession has often tasted. The very variety of the matter dealt with shows how unsatisfying is the excuse of some Presidents to-day that the "orange has been sucked dry," and that they can find nothing wherewith to refresh those who have honoured them to the extent of their power.

Mr. Hunt found many matters and many men to deal with; and, in regard to the latter, he said sufficient—for example, when dealing with purification—to show that he has not put off his armour, and is still prepared, if need be, for the fight. We must not attempt to follow Mr. Hunt through the address, as nearly every paragraph furnished suggestions for comment. How strong is the instinct of self-preservation in the gas industry is revealed in many parts. Costs increased and the electric light threatened. But new methods of working and labour-saving appliances have arisen, have been adopted, and have effectually turned the attack, by enabling gas to be produced cheaper than ever before, and so permitting it to continue its growth among the great utilitarian agents of the day. This in itself answers in some degree the President's question: "Have our methods of manufacture or construction kept "pace with the great growth of consumption?" The one is in large measure the issue of the other, if we look at the question from the economical aspect. If the methods of manufacture or consumption had not marched forward in their economical productiveness, then there is little need to ask whether we should have witnessed the rampancy of consumption which the question of the President indicates. But the real point for consideration is: Are the present methods of manufacture and construction adequate for a still further great progress? That is a question which must not be left for time alone to answer. There must be a restless activity in the profession to try to attain to higher things; so that if they are attainable, and if the present methods are not sufficient for the future, the industry may by the new means still go on its way rejoicing.

Beyond the President's address, the only other matter to engage the members was a short paper prepared by Mr. H. P. Maybury for the purpose of raising a discussion on inclined retorts. Save the author and one or two other members, the speakers were either dead against the system or entertained some doubt respecting it. But it will be noticed that there was only one member on the opposition side who had had any practical experience of the working of inclined retorts; and so the discussion may be regarded as useful by placing on record the views of horizontal men who have evidently given to it some amount of careful thought. At the same time, it once more shows the necessity of the Committee which was first suggested in the "JOURNAL," and of which Mr. Herring promises to propose the formation at the forthcoming meeting of the Institution of Gas Engineers. Encouragement to proceed with the motion is heartily given by Mr. Hunt, Mr. Paterson, and others.

Energy at the Manchester Institution Meeting.

THE meeting of the Manchester District Institution of Gas Engineers last Saturday possesses features of varied kind, and both regrettable and welcome—regrettable in that a portion of the proceedings was of a personal and not altogether complimentary character, and welcome in that the Institution shows that its virility is not by any means on the decline. Let us deal with the objectionable part of the proceedings first. No one can admire more than we do an organized body of men who take something higher than a complacent interest in the administration of their affairs; for a little activity will keep the direction from falling flat and becoming furrowed. But there are two ways of showing activity; and some men do not seem to be possessed of the faculty of discriminating as to which is the right. It is certainly not by accusation such as was heard on Saturday, but which it was pleasant to hear was not subscribed to in any quarter outside that in which it was made.

However, we will leave that particular point, and turn to the objection which was taken to the election of Mr. R. G. Shadbolt to the office of Secretary, on the general ground that he had already passed through the various offices of the Institution, and therefore should abandon his offer to take the position, and leave it open for the acceptance of some other member who had not occupied an official position. The ground of opposition was about the most porous that could have been selected; for eligibility for such an office as that of Secretary of an Institution of this special nature must be measured by experience of the inner work, and that experience can only be gained by first holding offices involving less individual responsibility. Taking this view, and Mr. Shadbolt being the only experienced member available at the moment, the members who voted for him unquestionably took the right course. But the nominee of the opposition was prepared to take the office; and, if we may intervene in this matter, we would suggest that the first opportunity should be taken to place Mr. H. I. Robinson on the Committee, so that he may obtain an insight into the administrative work of the Institution, which will fit him (if still disposed to take it) for the secretarial position when it once more becomes vacant.

Again, in the election of Committeemen, there was further division of opinion; and this is the second year that something very closely resembling wrangling over the question of representation has happened. Technical discussion is the main purpose of the meetings; but in some measure this has been subordinated at the last two annual meetings to the discussion of governmental matters. If Mr. Kendrick's notice of motion, that the procedure in connection with the election of officers shall be changed so as to conform with that of the Gas Institute, will bring about the apportioning of a greater amount of time at the annual meetings to technical work, then we sincerely hope he will succeed in getting the motion through.

It is quite a relief to pass to the more genial aspects of Saturday's meeting. It was a homely address with which Mr. Arthur Graham inaugurated his year of office as President. Mr. Graham is one of the old and constant attendants at the meetings; but he is not given to a frequent public expression of his views. The address, however, has disclosed his keen practical interest in the gas topics of the hour, and his capacity for taking the measure of the financial value of new methods. He gives an instance of this in discussing the subject of the removal of coke from the retort-house by manual and mechanical means; and it will come as a shock to many who have spent large capital sums on coke plants to find that Mr. Graham, taking figures given by Mr. Chester on the one hand and his own working figures on the other, has settled to his personal satisfaction that coke can be transported by barrows and hand labour at about 1½d. per ton cheaper than by coke-conveying plant. It is a satisfaction to find that Mr. Graham (like several of his colleagues at the Midland meeting) favours the suggested appointment of a Committee to determine a basis of comparison for inclined-retort working. Another particularly interesting point in the address referred to the naphthalene question. There seems to be a sudden fall of testimony to complete condensation being the panacea for the cure of the evil. Mr. Graham quoted an incident, Mr. Charles Hunt had something to say on the point only two days previously, and Mr. Charles Carpenter will add to his former statement on the subject at next Thursday's meeting of the Southern Association. If this kind of thing continues, the Naphthalene Investigation Committee of the Southern Association will find their task delightfully simplified.

A young member of only two years' standing—Mr. E. H. Hudson, of Normanton—came forward with a paper which broke into new ground for a gas engineers' meeting. It was on the "Control of Chimney Draughts;" and both in style and substance the contribution was excellent. Of course, all gas engineers are alive to the importance of controlling the draughts on their retort-settings; but Mr. Hudson has

aimed at securing an automatic control in his chimney-stack. Though it was demonstrated by Mr. H. Townsend that the apparatus Mr. Hudson has invented would not be of general utility, no one can get outside the fact that before he went (in what was an intelligent and scientific manner) into this question of automatic control, he had trouble, but since he has applied the apparatus described in the paper the trouble has disappeared. Moreover, he is relieved from the constant supervision which was before essential to maintain uniformity of heats in his settings. Such effort in the younger members of the profession must be encouraged; and it is not a piece of gossamer flattery when we say that the author has within him the faculties of research, invention, and application. His reply upon the discussion proved that he is not to be discouraged by adverse criticism.

In a paper on the disposal of coke, Mr. W. Whatmough explained to the members his success in cultivating a local domestic demand for this abundant and ever-increasing residual of gas manufacture; and gas managers who have not yet tried to develop a local household consumption in this direction cannot do better than profit by Mr. Whatmough's paper and example. The discussion on the paper was lifted into more than ordinary importance by an appeal made by Mr. S. Meunier, acting as the advocate for a number of the members, that the Institution should extend its work into the commercial side of the industry—to arrange periodical meetings for the exchange of views on trading matters connected with the members' daily work, and by circulating information among them as to the prices of residuals and the positions of stocks for their mutual behoof. Something has already been done independently of the Institution in this direction; and the subscribers have, they admit, derived a decided advantage. The idea is to confer, and to circulate information, for defence and not offence. Mr. Meunier explained the objects of his proposal so clearly at the meeting on Saturday, that it is unnecessary to enter into them here; but it may be said that the suggestion appears to us, subject to any fresh view that the report of the Committee of the Institution may produce, to be one worthy of consummation. Altogether, Saturday's meeting presents quite a plethora of interest.

Parliament and the Administration of Public Supply Undertakings.

The House of Commons had its first turn at the London Water Bill on Thursday, when Mr. Buxton attacked the administrative authority proposed by the Government, on the ground, mainly, that it was not the London County Council. There is a theory cherished at Spring Gardens, apparently, that the Council are an efficient, economical, and businesslike body! Mr. Buxton said as much. People who do not happen to belong to the present Progressive majority on the Council may be pardoned for doubting whether a public authority which owns to inability to ascertain whether its bricklayers earn their wages, deserves this character. The London County Council, however, and their clever members, who know everything without having learnt even one trade, are likely to hear some home truths as to what the public think of them before the debate on the Water Bill closes; so that it is hardly necessary to say anything more here upon this part of the subject. We have already said as much as there is to say, fairly, in criticism of the plan of arbitration proposed in the Government Bill; and, for the present, we desire to discuss only one or two points of principle. It is a sober truth that the people of London are supremely indifferent to the whole business. If there are any politicians who fancied that the Government might be upset over the Bill, they must feel bitterly disappointed. There has been for many years a factitious agitation, engineered by the London County Council, for the acquisition of the property of the Companies by a public authority, but the moment it appeared that the Government were disposed to agree to this proposition, with the rider that the authority should not be the London County Council, the enthusiasm of this noble body died away. Nobody else shared it.

It is true, as "The Times" remarks, that nobody believes that the expropriation of the Water Companies will benefit a living soul. Water will probably be dearer in consequence; and the ratepayer will have nothing to show as compensation. Still, the purchase is expedient, for several reasons. It will put a stop to an intolerable campaign of fussiness and expenditure promoted by the wiseacres and busybodies of the London County Council. If, as the last Royal Commission anticipated would be necessary in due time, an auxiliary supply of water for London must be had, it will be easy enough for a public authority to act in this sense, whereas a combination of joint-stock companies would meet with enormous difficulty. Again, there can be little doubt of the desirability of administering the water supply of London as a whole, which means putting it in Commission. It is a striking coincidence that at this juncture—when Mr. George Livesey is contemplating the reform of gas company administration in the direction of strengthening the heads of the undertakings—Government should be proposing the same course for the better control of the London Water Supply. Sir John Dorington went so far as to express the hope that "the Chairman and Vice-"Chairman would always be appointed by the Government." The suggestion was well received; showing that the House of Commons understands what is the source of inefficiency in joint-stock company administration. Naturally, this root-and-branch reform does not commend itself to the strenuous amateurs of popularly elected bodies, who think they know everything, or to amiable "guinea pigs" of company fame, who fail to see that the country is sick of their kind. Yet such is the stern truth. If nobody who had an important undertaking, in the shape of gas-works, water-works, or tramways, would willingly entrust it to the tender mercies of the London County Council, neither would he, if he could help it, place it in the hands of a gentleman who is chairman of this company, deputy-chairman of another, member of three or four other boards, and auditor of yet another unfortunate concern—and all without possessing a scrap of ability or a shred of knowledge for the discharge of the proper duties of one of his numerous offices.

At the same time, it is necessary to remember that paid presidents are not necessarily able men. The truth is, that the fundamental responsibility for selecting the right man is not to be got rid of by paying lavishly whoever happens to occupy the position. The proof of the pudding is in the eating; and it not unfrequently happens that the handsomest remuneration fails to descend to the right man. More rarely, a man with a great reputation proves in the long run to have been a very bad selection. Not to be too personal, let us say that there are English railways which will never recover from the disastrous effects of the protracted rule of certain professional chairmen from whom nothing but age or death could deliver the unfortunate undertakings. Yet these were famous men while they lived—clever fellows at managing a meeting, gave good dinners, and "all that sort of thing." After all, the question of how to make sure of getting the right man into the right place is the most difficult of the problems of the workaday world. It matters not who the man is, nor what is the nature of his proper office—the puzzle remains of how to bring them together. It is so with nations, either at War or in Peace. Success—nay, even existence—depends upon the supreme control being in competent, trustworthy hands at the critical moment; and how to secure this is the most pressing of all the needs of civilized life.

The Gas Industry in the United States.

In the last issue of the "Journal," there appeared an instructive return relating to the gas industry of the United States, taken from the Twelfth National Census. It is generally known that the United States Government make very much more of their census-taking than we do, and even go to the extent of working it up into a national stock-taking. There is a good deal to be said for such an amplification of the usual scope of a census; but, on the other hand, the risk has to be faced that machinery intended for one purpose may not lend itself successfully to the production of another effect. Indeed, the position of a United States census taker seems to be pretty much what he chooses to make it. He can address himself to the collection of very elaborate and exhaustive statistics, or he may leave it alone. Again, those to whom he applies for information may reply to his inquiries, or they may decline the information to disclose the extent of their business affairs. Consequently, all statistics collected in this free-and-easy way must be regarded in the light of their origin. The first attempt to take a census of the United States gas industry was in 1890, and was due to the energy of the gentleman who was appointed to the duty on that occasion. He was not too well supported, and consequently the latest returns exhibiting the growth of the

industry between 1890 and 1900 are slightly affected by the admitted incompleteness of the earlier data. Still, it is gratifying to learn that, in spite of all adverse conditions and the most intense competition, the number of distinct gas undertakings showed an increase of 18 per cent. for this decade. The increase of gas consumption was as much as 83·7 per cent., which does not look as though the industry was in a bad way in the United States. This growth of business has been accompanied by a reduction of average selling price of about 33 per cent.

There is plenty of room in the country for more gas and gas-works. One feature of this kind of return is that it tends to exaggerate the proportions of the exceptional and the abnormal, to the ordinary and established order of gas undertakings. Every strange enterprise figures by itself; and those who are interested in its fortunes naturally make the very most of its scale and prospects. For this reason, one need not take too seriously the report relating to the "coke-oven process" works, which the statistician in his observations on his returns—the text of which we were not able to give—thinks "may displace, to some extent, other methods of manufacturing gas for fuel and lighting purposes." It may or it may not. The process of consolidation of interests, which is really so marked a feature of American commercial developments, has continued to make progress in the gas industry—in which, indeed, it might almost be said to have originated. The observed reduction in the value of gas-works residuals may be partly attributable to the increased production of carburetted water gas. It is distinctly to be regretted that the form of inquiry for 1900 did not require a statement of the quantity of gas made by different methods. In 1890, the output was about half-and-half coal and water gas. Now the manufacture is so mixed up that it would be difficult for many works to say positively what the gas is made from; but the returning officer thinks that about 75 per cent. of it is water gas. This goes to show that there should be a good market for coke in the United States; and the indication is supported by an increased production of coke in special works. One is tempted to inquire what the Americans do with their excellent and abundant gas coal. Perhaps that is waiting for the development of the New South, which is a long time in hand. The North cannot always continue to grow big towns at the expense of the rest of the Continent; and the turn of the South, and of coal gas, must come.

Shaping the Welsbach Management.

The Provisional Board of the Welsbach Company are making progress with the selection of the definitive Board of the Company; but the task is by no means a light one, in view of the position at which affairs had arrived during the former dispensation. A statement has been published that the constitution of the Board has been completed; but this is not so—the appointments so far concluded being Messrs. Mattinson, K.C., Brinsmead, and W. W. Wright (the Secretary to the Advisory Committee). Regarding the other appointments, we welcome Mr. Kenneth H. Buchanan as the General Manager, and Mr. Laurence Fletcher as the Commercial Manager. Mr. Buchanan is known to a large number of gas engineers through his work in the Public Lighting Department of the Company; and it may be remembered that he was responsible for the splendid display of high-pressure gas lighting at the Glasgow Exhibition. Mr. Laurence Fletcher has also had some years' experience in connection with incandescent matters, having been associated with the Sunlight Company.

The Award in the Devonport Gas Arbitration.

In the paragraph referring to the Devonport award last week, to arrive at the net amount payable to the shareholders, we deducted from the award of £149,570 the amount of all debts and liabilities *bonâ fide* incurred by the Company; and so far this was correct. But, to prevent misunderstanding, we should have added that, as far as the shareholders are concerned, this amount has to be reduced by the assets as against the liabilities. The former figure cannot be definitely ascertained until the final settlement; but, in round figures, it will we understand amount to about £25,000. In reading the award in the peculiar way in which it was made, for the moment this was overlooked. The sum, therefore, to be divided among the shareholders, less the winding up and other expenses, will amount to 28½ years' purchase of their dividends. Mr. Valon, the Company's expert, claimed 30·77 years, *plus* an addition for compulsory purchase, and without any deduction for the deficient works. Mr. E. H. Stevenson, the expert for the Corporation, allowed 25 years' purchase—viz., £110,000; but he reduced this amount to £86,956 by deducting £23,044 for deficiencies of works, and making no allowance for compulsory purchase. His final figure therefore worked out at under 20 years' purchase (19·76 years).

Registration of Company Directors.

Much good was expected to result from the passing of the Companies Act of 1900; and if these expectations are not realized to the full, it will not be the fault of the Board of Trade, for they are apparently doing their best to enforce its provisions. Section 20 of the Act makes it imperative on all Companies, whether their capital is divided into shares or not (instead of limiting, as the 1862 Act did, the obligation to Companies whose capital was not divided into shares), to send in a copy of the Register of Directors and Managers to the Registrar of Joint-Stock Companies. The penalty for default is the very respectable sum of £5 a day; so that a heavy liability can soon be incurred by neglecting to comply with the terms of the Act. This, it must be understood, is quite a different thing from the ordinary annual return, which simply states the number of shareholders, directors, &c. It is intended by the Act that the register should be continuous; and therefore whenever any change takes place in the directors or managers, a fresh copy has to be filed. The Board of Trade have prescribed a form for making out the register, the fee for which is five shillings; so that there would seem to be no reason at all why the provisions of the Act in this respect should not be complied with. Nevertheless, it appears that very many Companies pay no attention whatever to the obligation, in spite of the ruinous penalty to which neglect of it renders them liable.

An Example.

A case which will no doubt serve as a warning to others similarly situated was tried at Huddersfield last week, when the Colne Vale Gas and Drysaltery Manufacturing Company were summoned at the instance of the Board of Trade for non-compliance with the terms of the Act. It was stated that the infliction of the full penalty to which the defendants had rendered themselves liable—somewhere between £700 and £900—would have meant the winding up of the Company. The Magistrates, however, recognizing the fact that the case was brought more as a public warning than for any other reason, inflicted a fine of only £10, out of which £5 was to be paid to the Board of Trade towards the costs incurred by them. Defendants' Counsel stated that he did not wonder the Company had failed to comply with the section, because it was misleading. It was thought by his clients that the annual return which they had for many years filed—containing a list of the Directors and of the shareholders—met the requirements of the Act. They will not, however, be able to think so any longer; and it is to be hoped that the lesson will not be lost on the other Companies who may be under a misapprehension with regard to the terms of section 20 of the Companies Act of 1900.

Changes at Croydon.

There was quite an air of change about the meeting of the Croydon Gas Company last week. The gathering was held in a different place from the usual one, a new Secretary read the notice, an alteration had been made in the constitution of the Board, and Mr. J. W. Helps (who has been for eighteen years Engineer and Manager of the Company) had had his title enlarged. On the other hand, there was no change in the excellent Chairman (Mr. Charles Hussey, J.P.), in the convincing character of his remarks to the proprietors, or in the vigorous and up-to-date policy which he enunciated. The removal of the meeting from the Company's offices must have been a convenience all round; and it also served another, but perhaps unexpected, purpose. It must have been the means of reassuring any timid shareholders present on the score of the competition of electric lighting in the district. The portion of the Public Hall in which the meeting was held was lighted by about thirty electric lamps; and the effect was, as Mr. H. D. Ellis truly remarked, disgraceful. With regard to Mr. W. J. Russell, who has resigned his position as Secretary after some 39 years of service with the Company, it is pleasant to think

that he is not altogether severing his connection with the undertaking, but that the intimate knowledge he has gained of the business will still be at the disposal of the shareholders. We most heartily hope that, in spite of the breakdown of his health, he may for many years be spared to fill the seat at the Board to which the Directors have elected him, besides granting him what can only be regarded as a handsome retiring allowance. The office of Secretary has been filled by the appointment of Mr. W. W. Topley; and we are sure that as time goes on the choice of the Directors in this matter will prove to have been a wise one. The Company being so generous to their staff, it was only to be expected that they would be generous to the consumers. During the past six months the dividend has only just been earned; and yet the Board have announced that the 2d. by which they had had to raise the price of gas owing to the high cost of coal would be taken off again at Lady-day. That this step will have its due reward, cannot be for an instant questioned; for the consumption is continually increasing, and prices of materials have for some time been falling. In moving the declaration of dividends, Mr. Corbet Woodall remarked that there could be no room for any shadow of doubt that the position of the Company was a very satisfactory one; and this must be the opinion of all who study the condition of affairs, and who are aware of the rich reward that is invariably reaped by such a go-a-head policy as that adopted by the Croydon Gas Company.

Facilitating the Purchase of Stock by Consumers.

The reduction in the price of gas is not the only means taken by the Directors of the Croydon Gas Company to earn the goodwill of their customers; they have also adopted another method. With reference to a new issue of capital about to be made, they have addressed a notice to the consumers to the effect that if any of them desire to invest in the Company a sum of £10 or upwards, the Directors will, on receipt of a deposit of 20 per cent. of the nominal value of the stock required, endeavour to purchase on the depositor's behalf at the auction sale, free of any charge or expense, and free of stamp duty, the amount of stock the consumer may wish to purchase. An undertaking is given that, unless a request be made to the contrary, the purchase will not be made at a higher price than £200 per £100 of stock. This step—which, of course, is in addition to the Auctioneer's (Mr. Alfred Richards's) usual offer to endeavour to purchase stock on behalf of investors who may be unable to attend the sale—is a most excellent one; and no doubt the consumers will largely avail themselves of the privilege. At any rate, if they do not, they ought to; for the limit named is a low one for a stock now receiving 9 per cent. (free of income-tax), and having the possibility of an increase to 10½ per cent. (less income-tax) on the reduction in the price of gas at Lady-day. We hope that this arrangement will be properly digested by the Bristol stock-brokers, who made such a terrible pother a short time ago because the Secretary of the local Gas Company offered to attend a sale of stock and bid on behalf of any shareholders who might be unable to be present. Our readers will remember that the brokers proceeded to boycott the Bristol Gas Company; and in this connection it is gratifying to learn, on the authority of the Chairman at the recent meeting of the Company, that no harm has resulted to the proprietors in consequence of the ill-advised action of the Committee of the local Stock Exchange.

The Critical Shareholder.

Gas and Water Companies are usually (although an exception occurs to us) so well managed that there is little chance of the critical shareholder rousing himself to action with any prospect of scoring points off the unhappy Directors. Still, in spite of the difficulties in his path, he does occasionally turn up. We met him at the meeting of a Water Company the other day, to which he came armed with a very long written indictment, which he proceeded to fire off, without any apparent result, at the Board; and last week he turned up again at the meeting of the Eastbourne Gas Company. In the latter case, however, the criticism was of so strong a nature that it brought from the veteran Chairman (Dr. G. A. Jeffery) a spirited defence of the policy of the Directors. The attack was headed (not for the first time) by Mr. H. M. Simmons, who, previous to the meeting, had circularized the shareholders, and to which circular the Directors sent out a reply. This, so to speak, "cleared the decks for action;" and though the meeting concluded with a vote of confidence in the Board being carried without a single dissentient, the proceedings were of a very heated character. Mr. Simmons appeared to find fault with everything; but chiefly with the coal contracts. The principal information elicited by the interrogator, however, had reference to a matter alluded to at a previous meeting. It appears that two years ago the Gas Manager (Mr. John Hammond), finding his stock of coal almost at vanishing point, and having great difficulty in obtaining further quantities, made up his mind that in future he would keep a larger margin on hand. In the spring of 1900 the coal famine was maintained; and then Mr. Hammond apparently lost his head a little, and entered into a contract for a large quantity of coal at a high price. As a result of negotiations on the part of the Consulting Engineer (Mr. H. E. Jones) and Mr. J. Worley, the Company got the worst of the contracts (which was stated to have been worth something like £10,000 to the contractors) cancelled for £3500. The Company thus saved over £5000 of the sum they were liable to pay as the result of what was, after all, merely an unfortunate mistake. One would have thought that the shareholders would be grateful for this, instead of bringing the matter up at meeting after meeting of the Company. At the time the contracts in question were made, it was impossible to tell to what price coal might go; and many other people bought at as high rates as the Eastbourne Gas Company, without afterwards being able to rectify what proved to be an error of judgment.

WATER AFFAIRS.

The Debate on the Government Bill.

THE Bill introduced by the President of the Local Government Board as "an honest attempt to deal with the very "difficult question" of the London Water Supply, occupied the attention of the House of Commons—or perhaps it would be more correct to say the Metropolitan members thereof—for practically the whole of the sitting on Thursday. It was expected, by the notices which had been put upon the paper, that the measure would be attacked from both sides of the House; and the expectation was fully realized. The principle of the Bill, that the undertakings of the Water Companies should be acquired by a public authority, was not discussed. It was to the constitution of the purchasing body, the mode of settling the price to be paid for the properties, and the method of payment, that the remarks of the participators in the debate were directed. Mr. Sydney Buxton, in the amendment he moved, dealt with the first point. He complained that the proposed Water Board was "unsatisfactory and unworkable, and repugnant "to the general principles of municipal government." The honourable member for Poplar and those who agree with him see only one body competent to manage the water supply of the Metropolis, and that is the London County Council. To this body, he contended, and not to the "conglomeration of heterogeneous authorities" created by the Bill, this important business should be entrusted He objected to what he termed the inadequate representation of Inner London upon the Board; and he tried to make out that the desire of the outside authorities was to be autonomous, and not to come upon a Board such as that proposed. We think the honourable member has altogether misunderstood their attitude. He confessed that he would rather be at the tender mercies of a Water Company than be a party to buying up the undertakings at an extravagant price, and placing the consumers under an inefficient body. He is by no means singular in this respect. There is no ground for the supposition that the price paid to the Companies will be extravagant; while as to efficiency of management, some of the public performances of the County Council have not been such as to justify confidence in their ability to manage such a big undertaking as the water supply of London. In fact, the opinion of most people is that they have already quite as many irons in the fire as they can conveniently look after. As will be seen by the condensed report of the debate which appears elsewhere, Mr. Buxton did not confine his criticism to the constitution of the Water Board, but extended it to the financial and other provisions of the Bill.

The second point of attack was on the Ministerial side of the House, and was led by Mr. E. Boulnois, the Chairman

of the West Middlesex Water Company. We have in some previous issues indicated the points in the Bill to which we consider the Companies were justified in taking exception; and the views of the Directors are fully set forth in the Memorandum issued by them a few days ago, and given in another column. Mr. Boulnois criticized more especially the Court of Arbitration and their method of procedure, both of which he characterized as being "unheard of." The Companies, as we have already stated, claim to be entitled to arbitration under the Lands Clauses Act—not necessarily with the customary 10 per cent. for compulsory purchase, for which there is no legal justification, but with some compensation for having to part with their property unwillingly. In this line of argument, Mr. Boulnois was supported by Colonel Lockwood, his colleague at the head of the East London Company, who specifically stated that the Companies would be willing to forego the 10 per cent. At the same time, they thought the principle of the Lands Clauses Act should be embodied in the Bill. Of course, the fact must not be lost sight of that the Court of Arbitration will only be called into action in the event of no agreement being come to between the Board and the Companies. But though, considering the constitution of the Board, it is very unlikely that terms will be arranged, the possibility of this being done is regarded by the Companies' opponents as an element of danger to the ratepayers. We think it may be entirely disregarded.

Two important contributions to the second reading debate were the remarks made by Mr. Mellor and Sir John Dorington, who, as members of Lord Llandaff's Commission, complained that their recommendations had been disregarded by the framers of the Bill. It certainly seems extraordinary that, after going to the trouble and expense of a Royal Commission to investigate a special subject, the Government should treat their report as so much waste paper. Instead of the comparatively compact body of thirty members, composed of men selected on account of their "business "capacity," and, if possible, "their knowledge of matters "connected with water supply," it is proposed to constitute what was contemptuously called by a member of the Commission a "debating society," the members of which would spend their time in contradicting each other. As the water supply is to be taken out of the hands of those who now manage it satisfactorily, the object should be to make the now controlling authority as businesslike as possible. Mr. Whitmore suggested that the Water Board should be reduced in size, and that, on the first occasion, the Chairman and Vice-Chairman should be appointed by the Local Government Board. Such a course, as Sir John Dorington told the House, was entirely consonant with the view of the Royal Commission; and its value, as conducing to efficient administration, hardly needs emphasizing. But this matter, with the allied one of the selection of specially qualified men, outside the constituent authorities, for membership of the Board, has been dealt with in a preceding article.

The whole trend of the debate was to show that the Bill —Mr. Long's "miscegenous bantling," as it has been contemptuously called by the "St. James's Gazette"—is open to considerable amendment. Mr. Boulnois denounced it as bad for everybody—for the Companies, the ratepayers, and the Government. Mr. Whitmore, on the other hand, took a much more moderate view. He urged that party feeling should be set aside, preconceived ideas on the question abandoned, and a united effort made to effect a really satisfactory settlement of it. He submitted that the shareholders should be neither worse nor better as the result of the transfer of the Companies' undertakings; and Sir William Hart Dyke emphasized the point that they certainly ought not to receive less income in consequence of the contemplated legislation. Sir Robert Reid expressed satisfaction with the Court of Arbitration, which he considers to be well qualified to discharge its duties, if rightly guided; but he thought the Companies should be at liberty to accept cash in payment of the price arrived at, and the purchasing authority to insist upon giving it. Mr. Grant Lawson closed the debate by defending the Bill of his chief. With regard to its most contested principle—that the terms of purchase should be settled by the three Arbitrators named, who would have a very wide discretion —he submitted that the occasion was a special and unparalleled one, and that it would not have been right to leave a matter of such magnitude as the one in question to the ordinary rules of a Court of Arbitration. The Government had chosen Arbitrators who could be trusted, and they desired that they should be trusted with a discretion as wide as possible.

At midnight, the debate was adjourned till yesterday, when it was resumed by Sir Blundell Maple, who, it will probably be remembered, introduced a Bill dealing with this subject towards the close of last session. After a long discussion, the motion for the second reading of the Government Bill was carried without a division.

Another "Domestic" Trouble.

Students of the law relating to water supply have lately been assisted by the luminaries of the Bench in arriving at the meaning of the words "trade" and "domestic" as applied in this connection. They now know that a boarding-house does not come within the former, but the latter category. No sooner is this matter settled, however, than they are confronted with another difficulty, in the construction to be put upon the words "other than domestic purposes." In the solution of the new problem they have been assisted by Mr. Justice Swinfen Eady, in a case which came before him last Wednesday. Under an indenture dated Feb. 16, 1852, certain lands, upon which stood, and still stand, a mansion and two farmhouses, were conveyed to the Sunderland and South Shields Water Company, for the sinking of wells, on condition that they would furnish to these buildings a free supply of water for "domestic and other purposes." The Company faithfully discharged their obligations, and even extended their free supply to a nursery garden. In course of time, the occupier sublet a portion of the outbuildings for the purposes of a laundry, at a rental of £50 a year; and the free supply of water was a factor which operated in the settlement of the amount. But the parties to this nice little arrangement reckoned without the Water Company, who very properly declined to regard laundry work, when carried on as a business, either as a domestic use of their water, or as fairly coming within the "other purposes" for which they had covenanted to supply it free; and they accordingly sent in a bill for £67 10s. The other parties disputed the claim; and a case was stated for the opinion of the High Court. In justification of their attitude, it was contended that the words above quoted meant every purpose for which water might be required, including trade or business. Mr. Justice Swinfen Eady asked the learned Counsel who put forward such a proposition whether he really meant to contend that if the house were converted into a paper-mill the Company would be bound to supply water free for paper making. The question was too "straight" for him; and so he evaded it by saying the house had not been altered, but that the stables were being used as a laundry. Then, said his Lordship, if parties could carry on a laundry in the stables, they could convert the house into a mill and use it for trade; but in neither case could they use the water supplied to the premises without paying for it. He accordingly made the necessary order to give effect to his judgment. The only remark we have to make on this matter is that, in our opinion, it should never have been necessary to invoke the aid of the Courts to substantiate what most people would have regarded as a perfectly legitimate demand.

The Pimlico Gas-Works.—Our readers may remember that towards the close of last year we announced the intention of the Gaslight and Coke Company to offer for sale by public auction their Pimlico gasholder station, consisting of upwards of four acres of freehold and leasehold property, with a frontage of 320 feet to the Thames. The announcement was confirmed by the Governor (Colonel Makins) at the recent meeting of the Company. The property was put up last Thursday by Messrs. Farebrother, Ellis and Co., at the Mart; but as the biddings did not go beyond £100,000 (£20,000 below the price required), it was withdrawn, and the Auctioneers have been instructed to negotiate a sale by private tender.

The Housing Schemes of the Hornsey District Council.—We learn from the Engineer and Surveyor of the Hornsey District Council (Mr. E. J. Lovegrove) that the Council's schemes for providing working-class dwellings, to which reference was made in our editorial columns last week, comprise 168 cottages already erected—108 at Hornsey and 60 at Highgate. The Hornsey Gas Company fitted the cottages complete, supplying and fixing all the necessary pipes, fittings, meters, and stoves, free of initial cost. The gas being supplied on the penny-in-the-slot principle, the tenants have only to pay for the gas consumed, and supply their own globes. Mr. Lovegrove finds in practice that the use of the gas-stove is very much appreciated by the working classes, particularly during the summer months; and he thinks the example set by the Gas Company might be followed with mutual advantage in other housing schemes.

ESSAYS AND REVIEWS.

THE GAS AND WATER STOCK MARKET.

(For Stock and Share List, see p. 576.)

THERE was no improvement last week in the general tone of markets on the Stock Exchange, and things remained dull. The chief item was the fortnightly settlement, which was lighter and more easily adjusted than its predecessor—thanks to the element of caution which a recent too reckless plunge of speculation had instilled as a lesson. This also prompted a sober tendency to invest in gilt-edged securities, which rose moderately in response. In other lines, prices varied irregularly, some up and some down; but none took a very pronounced step either way. In the Money Market, there was a good demand for Stock Exchange and other requirements, and discount rates ruled firm. Business in the Gas Market was very quiet on the whole, although, at the opening, there was some promise of activity, and transactions were much restricted. The available stock in the market seems to be to a great extent limited to one or two issues for which there is no great demand. There are others which are ready to move up, but the absence of stock prevents any dealings in them. It is confidently expected that, with a probable cheapening of raw materials among other factors, gas companies in general should do pretty well in the current half year, and their quotations are likely to rise. In Gaslight issues, the ordinary was again weaker. On the opening day, 92¼ was the best price it could command; and this was not reached again—the price slowly shrinking until the final bargain was done at 90⅛. However, the secured issues kept up steadily, and were moderately dealt in. South Metropolitan were not particularly active, and not very firm; the prices marked easing down to a final figure of 123, which was the lowest of the week. Very little was marked in Commercials; but a few inquiries sent up the quotations which were only waiting for a touch. Little was done in the Suburban and Provincial group, though at the Mart recently some parcels have been taken up at good prices, but slight advances on *ex div.* adjustments are perceptible in Crystal Palace and Tottenham. In the Continental Companies, continued weakness was apparent in Imperial, which dropped a couple more points; but business was very quiet. Among the remoter undertakings, Ottoman, Buenos Ayres, and San Paulo were rather higher. In the Water Companies, there was general stagnation until nearly the end of the week, when they almost all took fright at the debate on Mr. Long's Bill, and dropped down from 5 to 10 points apiece.

The daily operations were: Gas business on Monday was nearly all in Gaslights; and the ordinary fell ½. Commercial old and new rose 2 each. In Water, Lambeth fell 3. Tuesday was extremely quiet. Imperial fell 1. Wednesday was almost equally inactive, and quotations did not move. On Thursday, there was little more doing, but quotations showed more change. Commercial old rose 1, San Paulo ½, and Ottoman ¼; but Gaslight ordinary fell 1. On Friday, Buenos Ayres rose ¼; but Imperia fell 1. In Water, Chelsea, Lambeth tens, both Southwarks, and West Middlesex fell 10 each, and Lambeth 7½ per cent. and East London 5 each. Saturday was quiet and unchanged.

ELECTRIC LIGHTING MEMORANDA.

The Conversion of the City of London Company to Continuous Current—History of the Rival Systems—Necessity for the Change—Prospects.

THE leading electrical journals justly set great store by the conversion of the system of supply of the City of London Electric Lighting Company from the high-pressure alternating to the continuous current. The "Electrician" designates it the "crowning triumph" of the latter system; while the "Electrical Review" devotes a special portion of the current number to an illustrated description of the great works which the Company have erected during the past three years to carry out the adopted system of supply. It would indeed be difficult to over-rate the significance of this change of policy on the part of one of the largest electric lighting companies in existence, serving under competing terms the richest district in the world. For municipalities throughout the United Kingdom, and for gas companies, the lesson conveyed by the revolution in question is of the first importance. Let us dwell for a moment upon the facts. In the beginning of the new electrical industry, Siemens and Hopkinson, Edison and Kennedy, helped to found the direct continuous current system of generation and distribution on broad, simple engineering and physical lines. Before long, they were rivalled by another school of electrical experts, led in this country by Ferranti, who maintained that the other possible system—the alternating high-pressure current—was cheaper to instal and in distribution, and equally efficient. For many years, the advocates of the alternating high-pressure system had it all their own way, especially with local authorities who wanted to make the biggest show for their initial outlay.

At this epoch, the popularity of the alternating high-pressure system was owned by the electrical journals, which published articles on the subject. The separation between the continuous current and alternating current men was complete in the ranks of the electrical profession. The selection of the system for lighting a town was a question entirely of the consulting electrician. A few staunch professors of the original faith, such as Dr. Kennedy himself, never wavered in their allegiance. They held that, inasmuch as the work to be done consisted of the conversion of fuel into electricity, and the distribution of the latter to consumers of it for the three purposes of incandescent and arc lighting and the production of motive power, the most direct way of doing this must necessarily be the best. They denied that there was anything to be gained by first intensifying the current, and then letting it down again, as in the alternating system with transformers, except a little copper in the main cables, which would prove to be only a temporary advantage. Besides, any gain of this kind was dearly bought (they urged) at the price of having a current more trying for incandescent lamps, less suitable for arc lamps, and wholly unsuitable for power distribution. On the other hand, the alternating men could point to the enormous weight of copper mains required to transmit any considerable amount of the low-pressure continuous current. They could mostly underbid their competitors on this account, and had an additional advantage in a greater range for their generating station with regard to the district of supply. So the alternating current became, by stress of competition, the cheap system.

This was not invariably its characteristic, however. The City of London Company was an alternating current Company because its founders belonged to that party; certainly not for reasons of economy. There was never any other reason why they should have been committed to this system. It was not as though they had been compelled to go far afield for their generating station, like the London Electric Supply Corporation. It was a blunder that cost the Company dear. First it laid them open to the admission, as competitors, of the Strand Company, who offered to supply the more adaptable direct current. Next, the Company were constrained in face of this competition to reconsider their system, which meant that, as from about three years ago, they were advised to make all their extensions on the continuous current plan. It is an epoch-making decision for the electricity supply industry of the country. Notwithstanding their enormous capital expended upon alternating current plant, the Company were driven for their own protection to change over to the other system. In the first place, this policy was imposed upon the Company by the demand for power. This is where the gas-engine is touched. Lighting, of course, goes with power; and therefore the Company have decided to supply light as well as power from their new plant. The capacity of these machines is 7000 kilowatts already, which is almost large enough to do the whole of the Company's present business for nine months in the year. For the remaining winter months, the existing alternating plant will help, through "motor generators." In addition, as the continuous current can be stored, in course of time the City of London Company will be in the healthy condition, as the "Electrician" puts it, of having a few large batteries on the network, which will enable the engineers to smile when a sudden local fog descends upon a portion of the district.

All the foregoing is very instructive. Dr. Kennedy will say nothing about it; but those who have been of one mind with him throughout, in this regard, will experience a feeling of legitimate satisfaction. We can fairly claim to be of the number. It is not an occasion for any crowing over those who happen to have taken the side which the Fates did not favour; for anybody may be similarly mistaken. Moreover, the continuous current distribution of to-day is something different from that which was called the same in 1890. Voltage has increased until there is no such thing as a low-pressure distributing system in important business anywhere. One of the main recommendations of the alternating system consequently disappears from the comparison; and the continuous current remains supreme on account of its suitability for anything and everything that can be done by electricity—lighting, driving machines, working tramways, and storing by means of batteries. It is a prospect that should cause gas engineers to brace themselves to meet it with a stout heart; for the new electricity will prove a formidable rival.

THE INCLINED RETORT INSTALLATIONS OF GREAT BRITAIN.

THE sketches of the "Early History of Inclined Retorts" which appeared in the last two issues of the "JOURNAL" serve very well as a prelude to the collection of statistics with which we present the gas industry this week. The sketches traced the progress of events, and the evolution of the system, up to the year 1892, just before which, as the writer puts it, there was an "awakening" among English gas engineers to the advantages and importance of M. Coze's method of carbonizing coal. However, between 1892 and June, 1899, when the Privy Council refused to grant the application of the Automatic Coal-Gas Retort Company for a prolongation of their patent, the system did not, considering the length of the interval—six-and-a-half years—make such a bounding leap in adoption as it has done in the two-and-a-half years during which the construction of the system has been relieved from the repressing influence of royalties. Had there, during the six-and-a-half years, been the same activity throughout that the past two-and-a-half years have

INCLINED-RETORT INSTALLATIONS IN GREAT BRITAIN.

Works.	Number of Settings.	Number of Retorts in Setting.	Size of Retorts.	Estimated Total Productive Capacity Cubic Feet per Day.
Aberdeen	4	9	20/24 in. by 15 in. by 20 ft.	450,000
Ashton-under-Lyne	7	6 of 7 and 1 of 8	21/23 in. by 16 in. by 20 ft.	781,250
Batley	8	8	20/24 in. by 15 in. by 20 ft.	100,000
Birmingham—				
Nechells	52	8	21/24 in. by 16 in. by 20 ft.	5,000,000
Saltley (In course of construction)	52	8	21/24 in. by 16 in. by 20 ft.	5,000,000
Blackburn	10	8	20/24 in. by 15 in. by 20 ft.	1,250,000
Blackpool	10	8	20/24 in. by 15 in. by 20 ft.	1,250,000
Brentford—				
Brentford	30	6	24½ in. by 14 in. by 20 ft.	2,250,000
Southall	18	6	24½ in. by 14 in. by 20 ft.	1,350,000
	26	7	21 in. by 13 in. by 15 ft.	1,640,000
Brighouse	8	8	20/24 in. by 15 in. by 20 ft.	1,008,000
Bristol	10	8	24 in. by 14 in. by 20 ft.	1,150,000
Burnley	26	6	24½ in. by 16 in. by 15 ft.	1,600,000
Burslem	5	8	20/24 in. by 15 in. by 20 ft.	480,000
Cambridge	10	6	20/24 in. by 15 in. by 20 ft.	975,000
Chatterley Chemical Works	3	6	23 in. by 15 in. by 15 ft.	216,000
Ditto	11	6	23 in. by 15 in. by 15 ft.	792,000
Chesterfield	6	7	21/23 in. by 16 in. by 20 ft.	656,250
Coventry	12	6	26 in. by 16 in. by 16 ft.	1,000,000
Crystal Palace (Sydenham)	10	7	21/24 in. by 16 in. by 20 ft.	965,000
Dartford	4	6	24½ in. by 15 in. by 20 ft.	333,000
Dewsbury	8	8	20/24 in. by 15 in. by 20 ft.	1,008,000
Dudley	6	7	20/24 in. by 15 in. by 20 ft.	540,000
Edinburgh—				
New Street	2	9	22 in. by 15 in. by 20 ft.	400,000
Granton	56	9	22 in. by 15 in. by 20 ft.	10,000,000
Elland	6	8	20/24 in. by 15 in. by 20 ft.	756,000
Gaslight and Coke Company—				
Beckton	16	9	20 in. by 13 in. by 15 ft.	1,000,000
Bow Common	12	6	24 in. by 14 in. by 20 ft.	1,000,000
	30	8	24 in. by 14 in. by 20 ft.	3,000,000
Fulham	18	8	24 in. by 14 in. by 20 ft.	1,700,000
Kensal Green	36	8	24 in. by 14 in. by 20 ft.	3,700,000
Nine Elms	13	8	20/21 in. by 15 in. by 20 ft. Enlarged to 23/24 in. by 15 in. by 20 in.	1,300,000
Shoreditch	15	8	23/24 in. by 15 in. by 20 ft.	1,700,000
Halifax	24	6	22/26 in. by 16 in. by 20 ft.	2,304,000
Harrow (House in course of construction)	4	6	24 in. by 15 in. by 18 ft.	300,000
Hartlepool	6	7	22/24 in. by 15 in. by 20 ft.	672,000
Heckmondwike	6	8	20/23 in. by 16 in. by 20 ft.	750,000
Huddersfield	24	9	18/22 in. by 15 in. by 15 ft.	2,000,000
Ditto	20	9	22 in. by 15 in. by 15 ft.	1,500,000
Ilford	6	8	21/23 in. by 16 in. by 20 ft.	700,000
Lea Bridge	8	8	24 in. by 15 in. by 20 ft.	900,000
Leeds—				
Meadow Lane	28	7	20/24 in. by 15 in. by 20 ft.	2,500,000
York Street	12	8	20/24 in. by 15 in. by 20 ft.	1,250,000
Leek	5	8	20/24 in. by 15 in. by 20 ft.	625,000
Leigh	7	6	22/26 in. by 15 in. by 20 ft.	670,000
Liverpool	6	8	21/24 in. by 16 in. by 20 ft.	750,000
Malvern	10	8	21/23 in. by 16 in. by 20 ft.	1,250,000
Manchester—				
Gaythorn	18	6	24 in. by 15 in. by 20 ft.	1,500,000
Droylsden	5	6	24 in. by 15 in. by 15 ft.	360,000
Margate	8	8	20/24 in. by 15 in. by 20 ft.	1,008,000
Middlesbrough	16	6	18/24 in. by 15 in. by 20 ft.	1,100,000
Ditto	16	9	20/24 in. by 15 in. by 20 ft.	2,304,000
Middleton	6	8	20/24 in. by 15 in. by 20 ft.	712,000
Nelson	6	6	20/24 in. by 15 in. by 20 ft.	560,000
Newcastle (Staffs.)	7	9	24 in. by 15 in. by 16 ft.	755,000
North-Eastern Railway Company (Gateshead)	7	6	24 in. by 15 in. by 15 ft.	460,000
North Staffordshire Carbonizing Works	21	6	24 in. by 15 in. by 15 ft.	1,250,000
Ditto	19	6	24 in. by 15 in. by 20 ft.	1,500,000
Radcliffe	6	8	20/24 in. by 15 in. by 20 ft.	756,000
Rochdale	25	6	21/24 in. by 15 in. by 15 ft.	1,500,000
Rotherham	12	8	24 in. by 15 in. by 16 ft.	1,000,000
St. Albans	4	6	24 in. by 15 in. by 18 ft.	336,000
Salford	24	7	21/23 in. by 16 in. by 18 ft.	2,040,000
Shipley	5	8	20/24 in. by 15 in. by 20 ft.	640,000
Slough	6	6	23/24 in. by 15 in. by 16 ft.	500,000
Smethwick	4	8	20/24 in. by 15 in. by 20 ft.	500,000
South Metropolitan Gas Company—				
Bankside	18	8	24 in. by 13 in. by 20 ft	2,000,000
Greenwich (West)	52	34 of 6 18 of 8	(12) 23 in. by 15 in. by 15 ft. (22) 24/26 in. by 16 in. by 15 ft. 24/26 in. by 16 in. by 20 ft.	3,760,000
Old Kent Road*. (* This house is to be re-converted to horizontal retorts.)	15	8	22/24 in. by 15 in. by 18 ft.	1,500,000
South Shields	6	8	20/24 in. by 15 in. by 20 ft.	756,000
Swansea	12	8	20/24 in. by 15 in. by 20 ft.	1,250,000
Todmorden	6	8	22/24 in. by 15 in. by 20 ft.	768,000
Tunstall	6	7	22/24 in. by 15 in. by 15 ft.	504,000
Wakefield	9	8	22/26 in. by 16 in. by 20 ft.	1,125,000
Wolverhampton	24	8 and 9	24 in. by 15 in. by 17 ft.	2,250,000
Woolwich Arsenal	24	6	24½ in. by 14 in. by 20 ft.	1,900,000
	1093	= 8087		105,115,000

witnessed, then the financial tale of the Automatic Company would have been much more cheering than it was for those who backed their hopes by capital investment. There was development, but it was not general; and the period in large measure was marked by widespread and deeply rooted doubts and fears. The installations in the early nineties may to some degree be taken as tentative; but there came the time when the boldness of a few, and the proof of the system's efficiency, steadily began to clear the road of doubt, and to give courage to many more. The process of clearance is still proceeding; and the near future may see as a consequence the country more thickly studded with inclined retorts than it is to-day.

But to speak of the future is merely to speculate. To write of the position to-day, with our collection of statistics before us, is to write of known facts. The table which we have compiled informs us of the precise progress made by the inclined retort system in this country. We have endeavoured to make the record complete; but if any installations have been missed, we would ask engineers to apprise us of them, so that the profession may be put into possession of the additional information. It may, however, be taken that the figures appearing in the table are exact, as they have in every case been submitted to the engineers of the works named for revision; and as a correct record we believe it will be both interesting and useful.

The table may be studied from many points of view. The figures may be added together, divided, subtracted, and multiplied; and all sorts of instructive results will be obtained. We have been amusing ourselves to a certain extent in this way, and will give the figures. But first of all, it will be noticed that, in order that no injustice may be done to Ireland, we have headed the table "Inclined Retort Installations in Great Britain;" but so far as inclined retorts in Ireland are concerned, we may appropriate the celebrated chapter on "The Snakes of Iceland," and say "there are none." Wales is a little better—Mr. Thornton Andrews saving the representation of Welsh gas-works with the 96 retorts that he is now putting in. Had Mr. Herring not gone north, Scotland might have been badly represented. The big installation at Granton, however, compensates so far as numbers go for a good many little ones; and Mr. Herring, as the "Cock o' th' North" in inclines, has a companion at Aberdeen, with a small bench containing 36 retorts. There is little question that Scotland's gas-coal carbonizing policy has in large measure been set by its leader in Glasgow. Coming to England, we find that the North shows the most general adoption. With the exception of the Gaslight and Coke, the South Metropolitan, and Brentford Companies, the South is really in bad case from the inclined retort engineer's point of view; and the Eastern Counties and the South-Western district do not, so far as number goes, make any brilliant showing. Now if the progress in English gas-works continues, gas managers in Scotland and Ireland will not, when they set their faces towards England, find the prospect so fair as hitherto. For it stands to reason that in future in England the man who has practical experience of inclines will stand a better chance than the man who has not when vacancies crop up in those works where the system has been adopted.

But continuing the examination of the table, it is seen that, of any single company or authority, the Gaslight and Coke Company stand pre-eminent in numbers of inclined retorts—their installations reaching to the grand total of 1112 retorts. With four installations, the South Metropolitan Gas Company make a second—the retorts numbering 612; but the Old Kent Road installation is (what printers would call) "chalked for dis." When sending us the figures for his Company, Mr. Charles Carpenter put a big asterisk against Old Kent Road; and below were the words: "This house is to be re-converted to horizontal retorts." The note speaks volumes; and our thoughts naturally revert to a certain paper before the Institution of Gas Engineers, and between the views of the author of that paper and the quoted note we seem to trace some connection. But though it has been determined to repeat the historical performance of "knocking 'em in the Old Kent Road," Mr Braidwood, at the Company's West Greenwich station, seems to have a happy faith in the system, judging by his 348 retorts. However, the biggest installation under a single roof is Mr. Herring's at Granton, the retorts numbering 504. Mr. Henry Hack comes next with his installation of 416 retorts at the new Nechells works at Birmingham; and very shortly, when the Saltley installation of 416 retorts is completed, he will supplant the South Metropolitan Company as the holder of the second largest number of inclines under one administration. The dismantling of the Old Kent Road installation, too, will put Edinburgh third on the list; and honours will then also be about equally divided for the fourth position between the Brentford and South Metropolitan Companies. But we do not expect to see Mr. Herring stand third on the list for any great length of time—the day, in fact, may not be far distant when Edinburgh will occupy the premier position.

Again, the table shows that there are 58 companies and local authorities who possess inclined retorts. The installations number 78; and they are distributed over 70 works. Then it is found—perhaps our Continental friends will note this—that there are no less than 55 of the installations with the 20-feet length of retort; and only 23 installations are composed of shorter lengths. These 23 are divided as follows: 4 consist of 18-feet retorts; 1 of 17-feet retorts; 4 of 16-feet retorts; and 14 of 15-feet retorts. The total number of beds (including the three or four installations now under construction) is 1093; and in these are set 8087 retorts Settings of eights appear to be the favourites. Of these there are 37 installations; sixes come second with 24; and nines and sevens are represented by 9 each. Working out the retorts, it is found that there are 1700 of 15-feet length; 267 of 16-feet; 200 of 17-feet; 332 of 18-feet; and 5588 of 20-feet. The total length of retorts of 15 feet is 25,500 feet; of 16-feet retorts, 4272 feet; of 17-feet retorts, 3400 feet; of 18-feet retorts, 5976 feet; and of 20-feet retorts 111,760 feet. Therefore the inclined retorts of Great Britain would extend to a total length of 150,908 feet. Of course, the estimated total productive capacity depends to some extent on circumstances—the character of the coal for example. But taking the engineers' own computations of the capability of their retorts, we have in England inclined installations equal to a production of somewhere about 105,115,500 cubic feet per day, or a total of 38,367,157,000 cubic feet per annum.

Now we have shown by reliable figures the measure of adoption of the inclined retort system in this country. Remembering the time that the first installation was made, the progress cannot by any means be said to have been rapid. But the list to-day is a solid one; and the signs point to its early further extension. It would be interesting, having now given our figures, to know precisely how this country stands in comparison with other countries.

PORTLAND CEMENT AND COKE BREEZE.

The cognate subjects of portland cement and coke-breeze concrete were well threshed out at a recent meeting of the Discussion Section of the Architectural Association, when some valuable hints for constructors in this, the peculiarly modern building material, were placed upon record. The full reports of the paper by Mr. H. Howard Humphreys, which opened the subject, and of the various speakers' remarks, appear in the "Builder," from which this abstract account is prepared. Those who are not well accustomed to the employment of cement and the preparation and use of concrete for building purposes, may be pardoned for failing to appreciate the perennial and absorbing interest of the study; but, in truth, the study is one for a lifetime. No engineering constructor can say that he knows all there is to know about cement; and novelties in the way of concrete construction are being brought out every day. Cement and mild steel are the conquests of the past century in the realm of building and engineering construction; and although engineers have accomplished many triumphs of strong, cheap, and rapid construction by their aid, architects have scarcely recognized the potentialities of the new materials. The reason for this is partly, no doubt, because both cement and concrete have limitations which are more easily discovered than their unique excellences.

The processes employed for the manufacture of portland cement are well known, and therefore need not be described; but in connection with the newest process of all, which is called the "Rotary Process," gas managers may feel a particular interest by reason of the fact that coal dust, not coke, is the fuel employed to burn the cement "slip" to clinker. The commercial influence of the Thames and Medway cement trade upon the local trade in gas coke has been, and is still, very considerable. It remains to be seen how far this will be changed by the success of the rotary system of cement burning, which is being installed at the Swanscombe works of Messrs. Bazley, White, and Co. The cost of production by this process is reputed to be approximately three-fourths that of the cheapest of the older methods; while the product is credited with requiring much less aeration. Nothing in the way of a manufacturing process can seriously alter the nature of the product. The essential qualities of a good cement, according to Mr. Humphreys, are that it shall harden with reasonable rapidity under water; that it shall remain constant in volume; and that it shall develop considerable powers of adhesion and cohesion. The object of all testing is to ascertain how far these qualities are likely to be realized in a given sample. The customary 7-day test of the breaking strength of neat cement briquettes is no guide by itself as to the future behaviour of the material. Other tests must therefore be used, with more especial reference to the determination of the sample's soundness, which is the most important quality of all, as it relates to the point of constancy of volume.

The best way to ensure against a "blowing" cement, is to have it finely ground, and aerate it sufficiently before use. The test of the latter operation is that the cement should not be put into work until the heat developed after mixing with 20 per cent. of water does not exceed 6° in one hour. The old specification of weight per striked bushel is objected to. Mr. Humphreys relies upon chemical analysis taken in conjunction with the results of physical tests, but not otherwise. The chemical data to be looked for are: The proportions of soluble silica and alumina to lime, the proportion of magnesia, and the proportion of sulphuric acid. A sample ought not to contain more than 1¼ per cent. magnesia, 1¾ per cent. sulphuric acid, 1 per cent. carbonic acid, or 1 per cent. insoluble residue; and must not contain more than 62 per cent., or less than 58 per cent., of lime. Mr. Humphreys has great confidence in the Michaelis boiling test, which requires a mixture of neat cement to be made up with about 20 per cent. of water, set in damp air for twenty-four hours, and immersed in cold water raised to a boiling heat and maintained at that temperature for three hours. The test is admittedly very

severe; but a good cement to be used for important works should stand it.

In using cement that has been binned, if lumps can be felt, it means that the sample has begun to set with the damp, and all such parts should be screened out. In regard to the preparing of concrete, Mr. Humphreys prefers for the aggregate clean broken stone with enough sharp sand, 40 per cent., to fill the voids. If round gravel must be used, it is advantageous to add some sound broken bricks to the mass. Burnt ballast is the worst possible material. The addition of furnace clinker to stone gives considerable toughness. Mr. Humphreys advocates the careful placing of concrete *in situ*, and does not approve of ramming. The mixture should always be turned at least four times, if by hand—twice dry, and twice wet, the water being added by a watering pot with a rose. The same general principles apply to cement mortars as in the case of concrete—the cleaner and more angular the aggregate, the better the composition. New work should be covered to protect it from the sun, the wind, or frost. Coming to the class of armoured concrete, Mr. Humphreys thinks this kind of construction has a great future before it, especially as a check upon bricklayers. He lays stress, however, upon the importance of seeing that the metal buried in the concrete will not rust. The best preventive of this is a hot application of a dressing similar to Dr. Angus Smith's solution, but containing pitch and sand. One would think that this precaution should be observed whenever a concrete aggregate contained furnace clinker or coke breeze.

In opening the discussion, Mr. Max Clarke asked specially for information about coke-breeze concrete. This was because he was connected with the British Fire Prevention Committee, who have definitely decided that coke-breeze concrete is the best concrete for resisting fire. Some persons say there are two sorts of coke-breeze concrete—pan breeze and ordinary coke breeze; and Mr. Clarke wanted to know something about the relative values of these two different kinds of coke breeze. Mr. George Smith took up this point, and said he knew from experience that there are two kinds of coke breeze as stated, whereof the pan, or clinker, breeze is not nearly so satisfactory an aggregate for concrete-making as the coke breeze proper. Another speaker mentioned the possibility of alterations being made in the manufacture of gas, and wanted to know "whether the altered gas process increased the sulphur in the residual coke, and whether it altered the coke so as to affect a coke breeze when used as an aggregate—whether more or less sulphur was in the coke; and, if so, whether it had a prejudicial effect when used as an aggregate?" It is difficult to follow this point.

Then, again, there is the question of the expansion of concrete after it has set, sometimes long after, which is usually attributable to the employment of too fresh, unaerated cement. Certain coke breeze floors were spoken of that had been laid as one block, 120 feet long; and these had slowly expanded from 6 to 18 months after they were finished. How does coke-breeze concrete compare with other concrete in regard to expansion. Has the aggregate anything to do with this phenomenon? The speaker thought that coke-breeze concrete is not so liable to expand as ballast concrete; or, if it did, it would expand vertically rather than horizontally. It was another part of the question of the possible effect of sulphur, which is always present in breeze. The speaker had "had a case in which a hot-water pipe was laid in a pipe filled with coke breeze, and it rotted away in a very short time; and the explanation given was that there was sulphur in the breeze." One opinion was that the use of pan breeze for concrete should be prohibited; but another eminent architect who had the conduct of many large public buildings always specifies a mixture of pan breeze with coke breeze. There is much difference of opinion as to the effect of the concrete on iron buried in it; and the painting of the iron was strongly objected to by some, as tending to destroy the adhesion of the concrete to it.

It thus appears that one of the most important of the practical questions now agitating the minds of users of armoured concrete in construction—which is, whether or no there is any corrosion of the metal to be feared when the aggregate is furnace clinker or coke breeze—remains open. The question refers to these aggregates, and to them only, because it has been completely established that iron and steel well buried in stone concrete do not rust. There is another highly important consideration in connection with the laying of concrete floors in their place, which was not dealt with in the course of the discussion. We allude to the employment of permanent centring as a substitute for the usual scaffolding. There are many varieties of these centrings, which are made of terra-cotta and are dropped in between the flooring joists. As these blocks are intended to remain, the concrete can be made with less cement than when the scaffolding is meant to be struck after a certain time. On the other hand, they add to the cost of the construction.

PERSONAL.

The net value of the personal estate of the late Mr. WILLIAM CARR has been sworn at £14,159.

The Gas Committee of the Coventry Corporation had interviews last Thursday with six selected candidates for the position of Gas Engineer, in succession to Mr. George Winstanley. The result was a decision to recommend the Council to appoint Mr. FLETCHER W. STEVENSON, who was for some years with the Sheffield Gas Company, and on leaving commenced practice as a consulting gas engineer.

Mr. THOMAS OAK, who has lately retired from the Bristol Gas Company after a service extending over 47 years at their Avon Street station, where for 36 years he was carbonizing foreman, has been the recipient of several handsome presents subscribed for by the workmen.

Mr. R. H. AINSWORTH, of Stockton-on-Tees, has been appointed Manager of the Solihull Gas Company in succession to Mr. T. Jowett, who has gone to South Normanton. Applications for the position were invited under No. 3814, in the "JOURNAL," for the 4th ult., and there were above 100 responses.

Mr. W. T. LANCASTER, Manager of the Cefn Mawr and Rhosymedre Gas Company, Limited, has been selected from a hundred applicants, as the successor to Mr. E. E. J. Anderson, at Ripon. Mr. Lancaster was originally with the Colne Corporation, then went to Cambridge, and has had twelve years' experience altogether in gas manufacture. He is 35 years of age.

Alderman GIBSON, the Chairman of the Manchester Corporation Gas Committee, was last Tuesday entertained at luncheon by the members of the Committee, who presented him with an illuminated address heartily congratulating him on attaining the seventieth anniversary of his birthday. The address also expressed the hope (in which we may be permitted to join) that Alderman Gibson might long continue in health and strength to discharge the important duties of Chairman of the Gas Committee. Alderman Gibson, in responding to the toast of his health, expressed his gratitude for the compliment paid him.

A pleasant gathering took place at the offices of the Great Grimsby Gas Company on the 22nd ult., to enable the workmen to offer their congratulations and best wishes to their Manager, Mr. J. BROADHEAD, on the occasion of his marriage, and to ask his acceptance of a memento of the happy event. The gift consisted of a beautifully chased silver urn, with hot-water jug. It was presented, on behalf of the donors, by Mr. Joseph Sayner, the Assistant-Manager, who testified, as did Mr. J. B. West, who was in the chair, to the kindly consideration always shown towards the men by the Manager. Mr. Broadhead, in reply, thanked the men for their present, which he said he and Mrs. Broadhead would value, not merely for its intrinsic worth, but for the evident good will which prompted it, and for the circumstances with which it was associated.

OBITUARY.

By the recent death of Mr. T. S. GODWIN, Cheadle has lost one of its oldest and most respected townsmen. Deceased was for many years Chairman of the Gas and Water Companies.

The death took place last Wednesday of Mr. G. WHITTAKER, Chief Meter Inspector of the Manchester Corporation Gas Department, in his 66th year. He had been for 46 years in the service of the Corporation.

The death took place on the 22nd ult., at his residence at Windermere, of Mr. RICHARD VEEVERS, J.P., architect, late of Preston and Fulwood. Deceased was an elder brother of Mr. Harrison Veevers, of Dukinfield, and had attained the advanced age of eighty years.

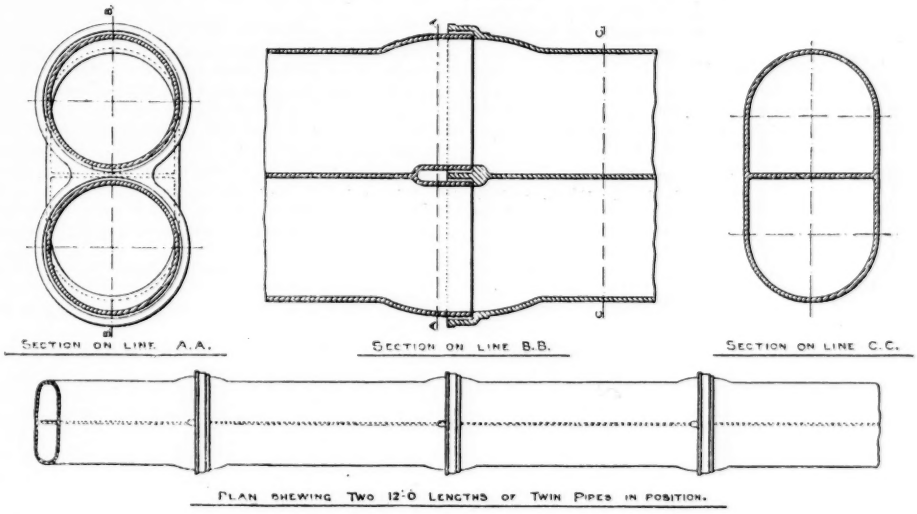
During the last few months, a good deal of interest has been aroused by exhibitions, in London and elsewhere, of a new description of electric arc lamp, the light of which is shadowless, and of a pleasing golden colour. There is an effective display of these lamps, among other places, high up on the façade of a new block of buildings in East Strand, opposite the London County Council clearances for the new street. Part of the effect here is due to causes which have often been pointed out in the "JOURNAL" as contributory to the cause of good street lighting for display. The frontage of the building is of new white, and consequently highly reflecting stone, which would make any light look well; and the arc lights themselves are hung at the right height to make a superior plane of illumination above, and necessarily in addition to, the ordinary public and shop-front lighting below. They are far too high for street-lighting pure and simple; but as display lights, they are very favourably placed. The Bremer lamp, which is of German origin, has a pair of carbons inclined towards each other at an angle of about 30°, so that there is no shadow. This device is not peculiar to the Bremer lamp, which is, however, claimed to have electrical and mechanical arrangements for obviating the inconvenience of the unequal burning of the carbons. According to the "Electrical Review," the operation of the regulating apparatus is based upon the changes of potential difference of the arc, which is not so good as in ordinary arc lamps, and there is always a tendency to unsteady burning of the lamps. The carbons used for these lamps contain a certain proportion of metallic salts, especially calcium fluoride. This component gives the colour. In consequence of the glowing particles of lime suspended in the wide-spread arc—the spreading being caused by magnetic action—the major part of the illuminating effect is due to the arc itself; whereas in other lamps, it comes from the positive crater. Moreover, the condensed components of the arc precipitate on the upper cone of the lamp, and, being white, powerfully aid, and at the same time soften, the light emitted.

COMMUNICATED ARTICLE.

A TWIN PIPE.

By R. J. Milbourne, Assoc.M.Inst.C.E.

The question of main-laying is often a cause of perplexity and irritation to gas engineers and managers; and although the writer of this article does not claim to be the proprietor of a nostrum calculated to bring peace and happy dreams to the aforesaid individuals, he ventures to hope that his suggestions may be at least of sufficient interest to them as to be worthy of their perusal and consideration.



Milbourne's Twin-Pipe.

It will readily be granted that the space available for main-laying is often so restricted that it is impossible to lay the pipes in pairs, side by side, as is sometimes required—for instance, in the case of the inlet and outlet pipes for a gasholder. And as the practice of laying them one above the other is obviously prohibited, it might necessitate the pipes making a wide detour, which would be a costly matter.

For the purposes of calculation, let it be first ascertained what is the cost of laying one main of (say, for an example) 24 inches diameter and 120 feet long. The minimum dimensions of the trench—in cross-section, plan, and elevation—are clearly shown in the illustration.

The pipe itself being 2 ft. 1½ in. diameter outside, the working space in the trench is only 8¼ inches on each side of the pipe. The dimensions of the trench have to be increased at the sockets, to allow the men sufficient room to make the lead joints freely. The quantity of ground removed would amount to about 72 cubic yards. The cost of excavation, filling in, and making good the road would be not less than 2s. 6d. per cubic yard—thus making the total cost amount to £9.

To lower 120 feet of 24-inch main into a trench, and joint up (say) ten pipes each 12 feet long, would probably occupy six men for a day, whose wages, at 5s. a day each, would amount to £1 10s. Then the total cost of laying 120 feet of 24-inch main equals:—

Excavation and filling in	£9 0 0
Men's time lowering pipes and jointing-up. . . .	1 10 0
	£10 10 0

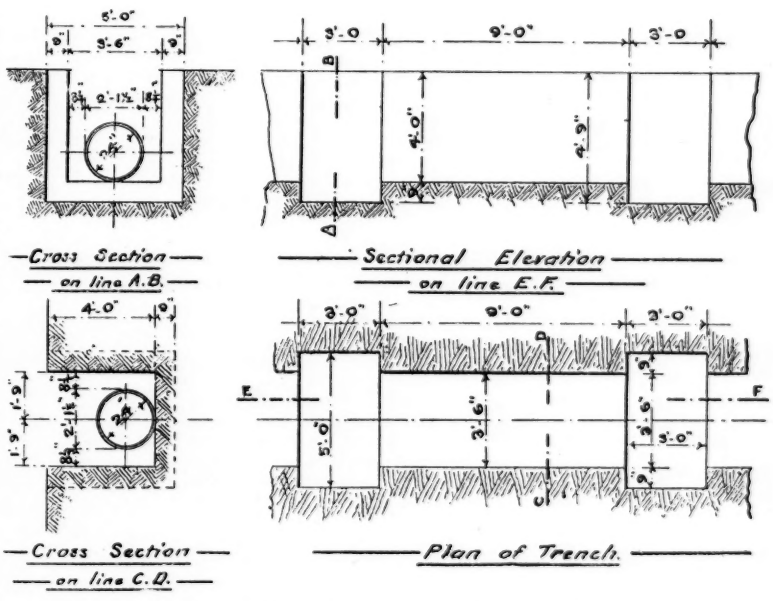
Now let the cost of laying two mains in one trench be calculated. Here, of course, the excavation is much greater, as the pipes in this case should not be less than 3 feet apart centre to centre, so that the dimensions, from outside to outside of pipes, would be 5 ft. 1½ in. The excavation then assumes a width of 6 ft. 6 in. in the straight, and 8 ft. at the sockets; and the depth will be (as before) 4 ft. in the straight, and 4 ft. 9 in. at the sockets, by 3 feet long. The total quantity of earth removed, and afterwards filled in, amounts to 129 cubic yards. As there is just twice the quantity of pipes used, it can safely be taken that the men's time for lowering them into trench, and jointing up, will be exactly twice as much as for a single pipe. Then the total cost of laying two lengths of 24-inch main, side by side in one trench, is as follows:—

Excavating and filling in	£16 2 6
Men's time lowering pipes and jointing-up . . .	3 0 0
	£19 5 6

Then comparing these, we have:—

Cost of laying 120 feet of double 24-inch main . .	£19 2 6
,, ,, single ,, . .	10 10 0
Difference	£8 12 6

These comparative figures are given with the primary object of emphasizing the difference between the cost of laying two pipes and that of laying a single pipe; and with the ulterior motive (on the writer's part) of producing an argument in favour of his suggestion, which he will presently unfold.



Details of Trench for 24-inch Diameter Pipes.

It will be seen that the cost of laying two mains of the same size, in the same trench, is nearly twice as much as that of laying a single main. But how much more costly would it be if it were impossible to lay two mains in one trench, owing to want of space; for it must not be forgotten that no consideration has been made for the space occupied by the earth thrown up from the trench, which would be as great as, or greater than, the trench itself—a serious matter in a narrow thoroughfare nowadays, when ground is of such great value. It might be so serious that it would be necessary to make the detour previously referred to. Such a flanking movement might involve the digging of a single trench of abnormal length; for sometimes the space available is so confined that the excavated material has to be carted away to some convenient or suitable site before the pipes can be laid, and, of course, carted back again when the trench is ready for filling in.

How are these conditions to be improved? A trench large enough for two pipes costs nearly twice as much as that of a trench large enough for one pipe. It is inconvenient to lay the

pipes one on top of the other. We are anxious to avoid the going-round process, because of the expense and trouble (and, moreover, the probability of having to pass through somebody else's premises). Then what are we to do? Why not adopt a "twin-pipe?"

By a twin-pipe, the writer means a pipe of an oval shape divided into two parts, each part having the same capacity, or area, as the single pipe in general use. Such a pipe is shown in detail on the drawing, from which it will be seen that there are practically two pipes in one casting, made in 12-feet lengths, and each length having double socket-and-spigot ends.

The pipe is so designed that it only occupies the same space in width as one 24-inch pipe. Vertically it takes up less depth than that of two ordinary mains arranged one on top of the other; while at the same time it provides an equivalent capacity. For instance, two pipes arranged side by side would require a space of 5 ft. 1½ in. from outside to outside of the pipes; while the twin-pipe would only require a space of about 3 ft. 8 in. from outside to outside. It will, therefore, readily be seen that, whether the twin-pipe be laid either vertically or horizontally, it would save excavation.

Assume they are laid horizontally. The width of excavation would have to be 5 feet, and the depth 4 feet in the straight and 6 ft. 6 in. at the sockets—requiring (say) for 120 feet length of trench, 92 cubic yards of excavation. This, at 2s. 6d. a yard, would be £11 10s., against £16 2s. 6d. for two ordinary pipes.

As a matter of fact, the cost of lowering a twin pipe into the trench, and jointing up, would be less than for two ordinary pipes, because (as is explained below), the weight of a 12-feet length of twin-pipe is less than the weight of two 12-feet lengths of single pipe. Consequently, the lowering would be accomplished quicker than would the lowering of two single pipes, not only on account of the reduced weight, but also on account of the one lowering sufficing for the two pipes. As it would be difficult to approximately estimate this saving without actual experience, we must, for purposes of calculation, take this item at the same figure as before—viz., £3. Therefore, the total cost of laying 120 feet of 24-inch twin-pipe would be as follows:—

Excavating and filling in	£11 10 0
Men's time lowering pipe and jointing-up . . .	3 0 0
	£14 10 0

Against £19 2s. 6d. for two single pipes laid in one trench Balance in favour of twin-pipes, £4 12s. 6d.

As the cost of laying 120 feet of twin-pipe vertically would be practically the same as laying it horizontally, the only advantage in favour of adopting the former method would be in the saving of ground-space horizontally—that is to say, the trench and earth thrown up would occupy less space than if the pipe were laid on its flat.

A twin-pipe would effect a saving of fully 5 cwt. of metal when compared with two ordinary 24-inch 12-feet pipes; and if any demand were made for these twin-pipes, the writer thinks that this saving in metal alone might be sufficient to compensate for the extra cost of moulding and casting, which would of necessity be greater than an ordinary cylindrical pipe.

There are various other points of advantage which occur to the writer—such as facility of handling to and at the site, cheapening of freight, less space required for storage, &c.—all of which would materially reduce the ultimate cost of main-laying where it is possible or necessary to adopt the twin-pipe system.

The writer might contend that a pipe of this description would be stronger, and less liable to fracture, than an ordinary pipe, or even two ordinary pipes, on account of the rigidity given to it by the central partition acting as a direct straight web-plate, and the whole thing being as it were more homogeneous.

As an argument against the use of a twin-pipe, it might be urged that should a fracture occur it would probably affect both compartments, whereas in a single pipe only the one would be affected. Such a thing might, of course, occur; but it would not necessarily be the fault of the system or design, because, as has before been stated, the twin-pipe would have greater strength (owing to the central partition) than would a single round pipe. Therefore, if a fracture occurred it might be due to faults of manufacture; and as all pipes should be thoroughly tested by hydraulic or atmospheric pressure, or be subject to a close and careful examination before leaving the pipe-founders' works, or at all events before being placed in position, the chances of fixing a defective pipe are remote. It might also be stated that there would be greater trouble in fixing valves or branches to a pipe of this description. A little consideration, however, will show that there is no reason whatever why special bends, tees, branches, &c., should not be made on this system as in the usual one.

In conclusion, the writer wishes to state that the above remarks are not written with any intention of puffing a patented invention or "pet" idea; but simply for the purpose of calling attention to a suggestion which he ventures to believe has never been made before. The invention—if such it may be called—is not protected in anyway; and if it is worth anything, it is hereby presented *gratis* to all who may think it worthy of their consideration.

It is stated that the late Mr. Charles Sellers has left between £40,000 and £50,000. Besides a large number of legacies to private friends, there are several benefactions to public charities, including £500 to the York Dispensary, £1000 to the York County Hospital (conditionally), and a good sum to the Salvation Army.

TECHNICAL RECORD.

MIDLAND ASSOCIATION OF GAS MANAGERS.

The Annual General Meeting of the Association was held at the Grand Hotel, Birmingham, last Thursday. At the beginning of the proceedings, Mr. THOMAS GLOVER, of Norwich, the retiring President, occupied the chair. Through various causes, the attendance of members was not quite so large as on the previous occasion, when, however, there was a record number present.

MINUTES OF LAST MEETING.

The HON. SECRETARY (Mr. A. Cooke, of Oldbury) read the minutes of the last meeting; and, on the motion of the PRESIDENT, seconded by Mr. B. W. SMITH (Walsall), they were confirmed.

ANNUAL REPORT AND ACCOUNTS.

The Committee's annual report and accounts were then presented. The former was mainly a record of the work accomplished during the past year; but, towards the end, it stated that during the twelve months four new members were enrolled, two members resigned, and two memberships lapsed under rule 15—leaving the number of members at 96. The accounts showed the Association to be in a flourishing financial position—the total balance in hand being £110 15s. 8d.

On the proposition of the PRESIDENT, seconded by Mr. J. T. LEWIS (Wellingborough), the report and accounts were adopted.

NEW MEMBER.

There was only one new member up for election—Mr. George Stevenson, of Long Eaton; and he was, by a unanimous vote, added to the roll.

THE OLD AND THE NEW PRESIDENT.

Mr. GLOVER said he had now to vacate the chair he had had the pleasure of filling for twelve months, and to ask their new President (Mr. Charles Hunt) to take it. It was a great pleasure to him (Mr. Glover) to have such a worthy successor. They were all proud of Mr. Hunt, and proud of being associated with him; and they were looking forward to his address.

Mr. HUNT, on taking the chair, was enthusiastically received. He thanked Mr. Glover for his kind observations regarding himself, and the members for their cordial reception.

Mr. R. O. PATERSON (Cheltenham) remarked that before proceeding to the real business of the meeting (which they were all anticipating with a great deal of pleasure), he thought that the members would desire to record on the minutes the satisfaction they felt with the Past-President's year of duty in the chair. They had had a year of considerable interest and progress in the Association's work. They had on one or two occasions been exceptionally favoured in the visits they had made to works in the neighbourhood; and these were instances in which Mr. Glover's year of office would be noted in the history of the Association. They had very lively recollections of his most excellent presidential address; and throughout the year, he had conducted the duties of the Chair to their entire satisfaction. He thought it would be the unanimous wish of the members that they should put on record an expression of their thanks to Mr. Glover.

Mr. J. FERGUSON BELL (Derby), in seconding the motion, observed that, as Mr. Paterson mentioned, the past year had been a most successful one, and this was due in large measure to Mr. Glover. He must say that the members' visit to West Bromwich was most instructive and enjoyable.

The PRESIDENT said he regarded it as a happy omen that his first duty should be to put a motion for a vote of thanks, so cordially proposed and seconded, to their late President. All that had been said, he most heartily endorsed; and he was sure the vote would be accepted with unanimity.

The motion was passed by applause.

Mr. GLOVER said the words that had been spoken regarding himself, and the manner in which the vote had been passed, made him feel almost as uncomfortable as he did twelve months ago. At the same time, he felt very grateful for the kindness shown him. He looked back on the past year—he could hardly say with mingled feelings, but with feelings of great pleasure, that they had had such a nice year together. He at one time looked forward to the year with a great deal of trepidation, and did not know how he was going to make it interesting. However, he was glad to know that his efforts had led to some measure of success, and that they had had an interesting year.

INAUGURAL ADDRESS.

The PRESIDENT then delivered his address as follows:—

Allow me, Gentlemen, to say how very highly indeed I appreciate the privilege you have accorded me of once more addressing you from this chair—a privilege which I prize the more because it enables me to round off, as I began, the first quarter-of-a-century of the existence of this Association. To me, personally, it is most gratifying to know that, dating from our modest inauguration of Oct. 11, 1877, in which only 10 took part, our history has been one of steady and almost uninterrupted growth. It is a satisfaction to us all that the goal of our esteemed Vice-President's secretarial ambition has been well-nigh reached; for

we number nearly 100 members, and possess a fund in hand amounting to upwards of £100.

The efficiency, however, of an Association such as this cannot always be gauged by the length of either its purse or its muster roll. The one may be hoarded up or misused; while with increase of numbers sometimes comes a slackening of individual effort. Whether this is to any extent the case with ourselves, it is not for me to determine. I am content to know that the objects for which this Association was founded have always been kept steadily in view. These objects are: The interchange of ideas and information among its members; and the advancement of professional knowledge and practice. In furtherance of them, our proceedings embrace almost every subject connected with the gas industry. Nor can it be said that our members have been in any way backward in introducing and applying improved methods of working or construction, or in extending the uses of gas. What this observation may imply can only be realized by the recollection of what has been accomplished during the last twenty-five years in all that relates to the economical development of gas supply, in regard to which probably no previous period has shown such solid progress. This assertion may appear somewhat difficult to reconcile as to cost of production, with the undoubted fact that working expenses have not of late years shown any appreciable diminution. In some notable instances, they have actually increased. The labour question has, however, to be taken into account. The important concessions made to gas-workers in the reduction of their hours of labour, accompanied or followed in many cases by increase of wages, have added heavily to the cost of manufacture, except where counteracted by the introduction of labour-saving appliances.

This may be illustrated by reference to the results at two of the Birmingham works, where, during the three years prior to any change being made—viz., 1880-1-2—the average cost of carbonizing was, in round figures, 2s. 2d. and 2s. 9d. per ton of coal respectively. At the cheaper of the two works, no alteration has since been made in the plant or in the mode of working, except the substitution of self-sealing for the old luted retort-lids, and the provision of small coal-trucks, from which the retorts are charged instead of from the retort-house floor. The furnaces, which are mostly direct fired, remain the same; and so also do the retorts. The retort-houses are much too narrow for any kind of stoking machinery; and the question of re-constructing or removing the works has, for various reasons, been left undetermined. At the other works, the carbonizing was transferred to a new retort-house, arranged for the delivery of coal with a minimum of labour, with larger retort-settings heated regeneratively, and, subsequently, complete equipment of stoking machinery.

In 1889 came the eight-hour shifts, with a slight increase of wages, followed by other concessions a few years later; the result being that in the one case the cost of carbonizing has increased from 2s. 2d. to 3s. 6d. per ton, whereas in the other it has actually decreased from 2s. 9d. to 2s. per ton. In the former, the addition of 1s. 4d. per ton represents the cost of the concessions made to the gas-workers—being 61 per cent. of the original cost of carbonizing. In the latter, this additional burden has been not only fully counteracted, but an actual saving of 9d. per ton effected. Labour-saving appliances are thus to be credited with a reduction in cost for carbonizing wages of 2s. 1d. per ton, as compared with the most costly system, against which has to be placed interest on additional capital expenditure, and cost of upkeep of machinery.

These figures include in each case every item which it has been usual to place against "wages" as distinguished from "repairs." They are from official returns, and are strictly comparable. They speak for themselves. But in connection with them, it may be remarked that reductions of the amount of hand-work have appeared to me to be the object of Trades Union efforts rather than any unfair limitations of the work of the machines; the extended use of which has been promoted thereby. It may be hardly necessary to add that stoking machinery has, so far as my observation extends, been popular with the men from its introduction; and there is good reason to believe that to work on it is valued as a privilege. Nor could it well be otherwise. However much we may be tempted to admire the agility and dexterity of a half-naked athlete engaged in the sweat of his face, in charging or drawing retorts, this is a spectacle which can well be spared. We turn with feelings of relief to view the movements of a machine, by directing which one man does, with comparative ease, the work of several men. This man has a better chance than the others of leading a steady, healthy, and self-respecting life.

Of the two systems of stoking machinery in present general use, one—the most recently introduced—may be said to have jumped at once into position and favour as being suitable for employment on a large scale. Machine stoking has, however, found a welcome and a home in almost the smallest as well as in the largest works; and this is due mainly to the unpretending genius and dogged perseverance of a single inventor, who, having grappled successfully with his own limited requirements, continued his efforts, to prove, as opportunity offered, the suitability of his system to the largest works. This development from small beginnings is a feature of the period which is now drawing to a close; and whether or not the knell of horizontal retorts has been sounded, the name of John West will continue to be held in honour as that of one who strove long and persistently, and sometimes under sore discouragement, to lighten human toil.

Apart from his elevation to the dignity of a machine man, a great improvement has taken place in the material surroundings of the gas worker; for retort-houses designed for horizontal retorts are now almost invariably constructed of ample width for ventilation under normal conditions. Such, however, is not always the case when inclined retorts are provided for; the result being that the heat upon the charging-stage is apt to be extreme. A similar effect is produced upon the discharging side where there are no means of ventilation at or near to the stage level, of if the hot coke—of which there is a double quantity as compared with horizontal retorts—be not speedily withdrawn as it falls from the retorts. If a conveyor be used, it may be found advantageous to place this well below the level of the stage, as proposed to be done by Mr. W. R. Herring in his fine retort-house at Granton, which some of us were privileged to see last autumn. In giving attention to these details, we are really acting in our own best interests, because human endurance has to be paid for according to the extent to which it is drawn upon.

Are inclined retorts really automatic? is a question to which much attention has lately been directed. It implies a doubt which is injurious to the reputation of the system, and which is undeserved so long as examples of practically automatic working can be quoted. The conditions which have to be observed in order to secure this are such as should at the same time ensure the very best carbonizing results, and are therefore worth aiming at. But however perfectly a new setting may be found to work, it is not yet clear that a continuance of equally satisfactory working can always be relied upon, and with any kind of coal. Some of the most successful installations of these retorts have also been the smallest; and it is no slight merit of the system that it places small works almost on a level with large ones as to working cost. For carbonizing on a large scale, however, the superiority of this system over that of horizontal retorts worked by power stoking machinery has still to be demonstrated. A proper comparison of the systems will include the actual capital expenditure in each case, in addition to the cost of working and maintenance for a period sufficiently long to cover the ordinary duration of retorts.

Inclined and machine-worked horizontal retorts alike require coal breakers, elevators, and conveyors. This machinery is, according to my experience, more liable to break down than the actual stoking machinery. To guard against this, it should be of a capacity well above its work, and arranged with the utmost simplicity. The coal should also be fed to the elevators or conveyors with as much regularity as possible. The gravity-bucket system, which is now used at various electric lighting and traction stations in this country, seems to fulfil the chief conditions which are necessary to smooth and continuous working—viz., slow running, avoidance of undue strain from varying loads, and a minimum of gearing. Mr. Robert Porter, of Elland, appears to be the first to employ this system for gas-works purposes. It will, however, be recollected that a similar system was applied some years ago at the Manchester and Salford Gas-Works, for supplying charging-machines direct, without the intervention of a fixed hopper.

The inclined-retort system simplifies the handling of both coal and coke, inasmuch as these are dealt with on opposite sides of the retort-bench. This should facilitate the employment of coke-conveyors, the value of which in connection with horizontal retorts has been in evidence for some time past. They form the last link in the chain of mechanical contrivances by which manual labour in carbonizing is—except as regards the generators—entirely superseded. The wear and tear of these conveyors has hitherto proved to be excessive; but this can, to a large extent, be met by having a few wearing parts, and making these as durable as possible. With care in these respects, it will be found that there is not much to choose between a "push" or "drag" and a "pan" or "plate belt" conveyor, each of which, when under load, takes about the same amount of power to drive it. The "push" or "drag" conveyor has the fewest moving parts, although probably the wear of the trough counterbalances this advantage; it is also capable of being continued up a fairly steep incline. It seems a little singular that it should have been left to a foreigner to demonstrate the suitability of such a familiar type of conveyor for hot-coke transport. Anyhow, we are indebted to M. de Brouwer for having given an impetus to this subject that bids fair to carry it far.

To mention regenerative furnaces, at once recalls to our mind our first visit to Cheltenham in the autumn of 1882—nearly twenty years ago—under the presidency of Mr. R. O. Paterson, who was one of the founders of the Association. It was our first visit; for we have on two occasions—which are red-letter days in our calendar—been most kindly and hospitably made welcome by Mr. Paterson and his Directors. Our second visit was made in 1894, when Mr. Paterson was again, and for the third time, President of the Association. What we saw on these two occasions very aptly illustrates the material progress of which mention has already been made.

In 1882, we had the opportunity of seeing the Cheltenham works under the old conditions of working, with narrow and inconvenient retort-houses and small direct-fired settings; and also with Spinney's ovens still in use. These latter are scarcely known to the present generation of gas men, although they were famous in their day. When we revisited the works in 1894, all was changed. A new and roomy retort-house had taken the place of the old structures; and instead of the old carbonizing plant, there were in full operation large retort-settings of the most

modern type, heated by regenerative furnaces of the most approved form, and operated by stoking machinery. It is needless to say that the wisdom of this transformation has been abundantly justified. Mr. Paterson is far too modest to speak much of his own doings; but these speak eloquently for him in the fact that his Company sells gas to-day (under normal conditions as to cost of coal) at 8d. per 1000 cubic feet less than prior to the reconstruction of the works. A somewhat similar experience might be quoted by many who are now in this room. It is with pleasure that we are able to recall numerous visits paid by the Association to works that have been either modernized or completely renewed during recent years—visits which have invariably proved to be in the highest degree both interesting and instructive.

At the Cheltenham meeting in 1882, a description was given by me of an installation of regenerative furnaces which had been made the previous year at the Adderley Street works in Birmingham. It may interest members to know that these furnaces are still in use, much in their original state, though now needing complete renewal. As they were the first of the kind erected in this country, they may be said to have inaugurated the system which has since been very extensively adopted, and to the growth and spread of which members of this Association have largely contributed. This foreign importation was viewed with some degree of jealousy, and was denounced as complicated and unnecessary for the purpose. It, however, survived all the hard things that were said of it, and, indeed, soon began to flourish exceedingly; being, moreover, beset with that kind of attention which is said to be the sincerest form of flattery. The discovery was soon made that there are many more ways than one of constructing continuous regenerating flues; but none of these can claim to exceed the original in efficiency, having regard to space occupied, or economy of material. There are no doubt efficient regenerators constructed with fairly thick division walls; but in such cases the flues must be of much greater length than any which are formed with (say) the Klönne or similar brick, no part of which need exceed from ¾ inch to 1 inch in thickness.

Mr. William Foulis recently related an experience of his own, which bears testimony to the value of regenerators for heating gas-retorts, and which he will, I feel sure, not object to my repeating. Those who attended the International Engineering Congress at Glasgow last autumn, had the opportunity of seeing at the Dawsholm works some fine settings of twelve retorts. When showing these to some of his visitors, Mr. Foulis observed that the first winter the settings were in use, they did not heat properly. Two more feet in depth were then added to the regenerators, and the heats have since been quite satisfactory. These settings are heated by outside producers; one producer to two through settings. This mode of concentrating the work of firing away from the retort-bench was first applied at the Old Kent Road works by the late Mr. Frank Livesey. It has advantages which, under certain circumstances, are probably cheaply purchased at the cost of transporting the coke. It may also be found to lend itself to an almost entire abolition of the work of clinkering, by rendering practicable the employment of producers of the Mond or Duff types. One of the latter was on view at the Glasgow Exhibition; and those who saw it in operation, cannot but have been impressed by the ease with which the clinker was removed from it, in contrast to the labour which ordinarily attends its removal from a generator or boiler fire. We know, however, that steam, as used in this case, can be applied similarly, and with considerable advantage, to almost any description of fire.

At the 1892 meeting of the Incorporated Institution of Gas Engineers, I ventured to advocate a more general use of large plant, by extending the practice which usually obtains in works of small or medium size, of making extensions by means of replacements rather than by additions. At an earlier period of my career, I had experienced some of the inconveniences which result from a multiplication of plant; having been connected with an undertaking—then in an extremely bad way—the extensions for which had been made piecemeal for a considerable time. My remarks may have appeared—as they probably were—superfluous, considering the great strides that were then being made in the desired direction. They might not be thought quite so inappropriate if uttered to-day, seeing that the multiplication of plant has recently been recommended on the ground that large areas are a mistake. It may not, therefore, be amiss to call to mind what Mr. Thomas Newbigging, in his very useful "Handbook for Gas Managers," has to say on this very point of large areas as regards purification. He says: "In determining the size of purifiers . . . . it is of the utmost importance to provide a liberal superficial area, and to make ample allowance for increased make." And, again, "One of the chief conditions for securing satisfactory purification is the use of vessels of large area. If economy and efficiency are to be considered, time is an important element, and must not be disregarded. The mere passing of the gas through the purifying media is not sufficient in itself to ensure good results, time—or what is the same thing in this case, lengthened contact—is required for chemical affinity to operate."

This advice has been generally accepted as carrying with it all the weight of accumulated experience. Under its influence, the gas manager, whether of small or large works, is immaterial, does make ample allowance for increased gas make—providing probably for the next seven or ten years. In doing so, however, he must work for a considerable time with a very much larger area than experience has shown to be sufficient for safety. In other words, he is employing that large area in proportion to his make, which is now declared to be a mistake. What has he to say to this assertion? Does he believe it to be correct? Does he not, on the contrary, know that since he made this provision for the future, he has had less anxiety, and his revenue account has had a more healthy appearance than ever before?

With the all-lime system, it is no uncommon thing to find that less lime is required during the summer than during the winter months in proportion to the make. A case is within my own experience in which, for the last three years, the consumption of lime, according to the gas made, has averaged less (after allowing for a slight reduction in the total percentage of impurities) by over 7 per cent. during the six summer than during the six winter months, with practically the same purifying area in operation; this being in the proportion of considerably more than 400 super feet per million cubic feet of gas per diem.

There is probably an economical limit to the size of purifiers, since the larger the area the greater must be the opportunity for the gas to take the line of least resistance; but this would not be inconsistent with the belief that large areas are not a mistake, unless accompanied by defective distribution. It may be possible to effect economy of capital outlay by employing a number of vessels of small size, or of special construction; but no question of principle is, or can be, involved in this—it is simply a question of expediency. When the quantity of gas to be dealt with is large, it may not be convenient to fractionate this to any extent. A 5 million cubic feet washer or scrubber, for example, requires but little more daily attention than one of only a tenth this size; and no inconvenience is experienced when it is worked at much less than its nominal capacity—the supply of water being regulated accordingly. This is really a case in which large area should prove to be a distinct advantage, because of its effect upon the order of removal of the acid gases in combination with the ammonia. Ammonia itself is very easily and quickly removed from the gas by reason of its extreme solubility in water; but longer contact is necessary to remove along with it a fair proportion of carbonic acid and sulphuretted hydrogen, and still longer contact if it be desired to give preference to the removal of carbonic acid.

Have our methods of manufacture or construction kept pace with the great growth of gas consumption? We are still without purification in closed vessels, although Mr. Thomas Holgate has done some good work in this direction. A notable advance has, however, been made by the introduction of what are known as Green's purifiers, by which the water lute and cumbrous purifier cover are dispensed with; while as regards gasholders. there is no room for doubt as to what the answer to such a question should be. On turning over the leaves of "King's Treatise on Coal Gas," we read of the 3 million cubic feet gasholder at Kennington Lane as being the largest in the world. This was in 1878. A few short years afterwards—viz., in 1891—the largest gasholder in the world was one of four times that size. To Mr. Corbet Woodall, however, does belong the merit of having begun the era of large gasholders with the one referred to, although the great impetus to it was given very shortly afterwards by Mr. George Livesey, who showed at Old Kent Road, not only how to make gasholders large, but also how to make them cheaply. Since that time, gasholders of very large size have become common; and although no one has yet ventured to dispute the supremacy of the 12 million cubic feet one at East Greenwich as the largest, and at the same time the cheapest, combination of tank and holder in existence, this can only be a matter of time and opportunity. Incidentally, it may be mentioned that the 2,100,000 cubic feet holder, erected by me at Nechells in 1876-7, was at that time—unless I am much mistaken—the largest in the Provinces. This position is again held at Nechells by the 8¼ million cubic feet holder erected by my colleague, Mr. Hack, although shortly to be taken from it by the two 8¾ million cubic feet holders which are in course of erection by Mr. Foulis at his new Provan works.

Over fifty years ago, a lesson in economical gasholder construction was taught by Alexander Angus Croll, in the building of the then Great Central works at Bow Common. It remained, however, practically unheeded—though not without protest from Mr. George Anderson, an old Great Central man—until Mr. Corbet Woodall appeared in 1874 as a convert to the abolition of roof trusses. This was an epoch in gasholder construction, because from it, to all appearances, dates the adhesion to the new-old idea of Mr. Livesey, who, a few years later, leapt at one bound to the position of foremost gasholder constructor of his time. Thanks, very largely, to modern publicity and interchange of ideas, the lesson which in his turn Mr. Livesey taught in 1879 did not share the fate of the earlier one of 1849. It was, on the contrary, followed by a period of great activity and enquiry, to which belongs Mr. Cripps's authoritative disquisition on the "Guide-Framing of Gasholders;" Cutler's improvements in guide-framing; Mr. Webber's criticisms of the guide-framing as unnecessary; Mr. Livesey's partial abolition of the latter; and, finally, the frameless gasholders of Gadd and Mason and Pease. Of these different methods of construction examples now abound; and of some of them it is much easier to say that they have their limitations than to define what those limitations are.

Reference has already been made incidentally to the amelioration of the conditions of labour which figures so prominently among the events of the lifetime of this Association. That this amelioration should not have been unaccompanied by occasional

resort to the crude weapons of industrial warfare is, and must remain, a matter for regret, since the only tangible result of gas workers' strikes has been temporary inconvenience to the public, and untold hardships endured by the dependents of the strikers. The most important concessions have not been wrung from the employers by material force. They are either the fruit of negotiations, or of voluntary action in deference to the spirit of the times, which requires that, so far as the exigencies of practical work-a-day life will admit, opportunity shall be given to all to lead higher, healthier, and happier lives. It is not a sufficient answer to this that to some men shorter hours and higher pay only spell football or self-indulgence. To others—and, there is reason to believe, an increasing proportion—they mean increase of home comforts; and that is an object which is well worth compassing. One can remember the time when it was almost an exception for a gas stoker to have a second suit of clothes, so little did he experience the need of one. The abolition of Sunday labour, which, by the way, has been the rule in Birmingham for about 25 years, has, however, greatly changed him; and it is no trivial satisfaction to see him in his Sunday best, when you also are in yours.

Self-respect and thrift often, although not always, go together; and they are qualities which generally mark the man who is to be relied on. Profit-sharing, therefore, in its encouragement, and even enforcement, of thrift, performs a most useful service—albeit compulsion in such matters may not be always a very stable prop to lean upon. A thrifty man, however, may be, and very often is, possessed of only very ordinary intelligence; and something more than this is wanted. Profit-sharing should be a very powerful incentive to good work, and as such is invaluable and necessary for the rank and file, who otherwise might have neither hope nor interest in their employment. But the best services of men are not always to be commanded by money. Considerate treatment and a keen eye for merit count for much. We know what was said of Napoleon's conquering armies—that every private soldier carried in his knapsack the bâton of a field marshal. That is the sort of feeling which is worth cultivating in the ranks of our industrial armies, and which can only be inspired by a leader of men. The obligation imposed by the Workmen's Compensation for Accidents Act of 1897 had already been extensively recognized among gas undertakings, both private and municipal. In other directions—such as the formation of sick funds and superannuation or old-age pension schemes—voluntary effort continues to be active in the endeavour to cement the relations between employers and employed.

It is most unfortunate that modern carbonization should have brought with it an increase of trouble, in many quarters, from naphthalene deposits. I do not now refer to the production of this substance on gas-works as a kind of bye-product; for that is by no means of modern origin. I still retain a very lively recollection of its abundance at the Nine Elms works fully thirty-five years ago, although it had not then attained to the dignity of a bye-product. I recollect also the great improvement made by my former chief—Mr. Robert Morton—by the simple expedient of causing the gas to be drawn, instead of pushed, through the condensers, and also by adding to the latter by means of pipes carried horizontally round the walls of the retort-houses. Naphthalene was also prevalent in the district supplied from those works, particularly in the low-lying portions; and the expedient which was periodically adopted, on the advice of a late eminent Engineer, to get rid of the deposits, was to "sweep the mains with cannel gas." This liberal if crude method of dealing with the nuisance is probably not now resorted to; but when reading of enormous "finds" of naphthalene in gas-works, one is carried back in imagination to the eighteen hundred and sixties, when regenerative furnaces were as yet unknown.

The plague as it infests the Provinces to-day is a comparatively recent visitation. As a rule, but little is seen of naphthalene on the works; and tests of the outlet gas reveal its presence in minute quantities only. Yet a few grains in 100 cubic feet are sufficient to cause an immense amount of trouble and inconvenience in the district. It occurs principally (in fact, almost wholly) at certain seasons of the year—viz., in summer and autumn, when the atmospheric temperature is high and variable. How may this remnant—for such it is—be removed? By washing with solvent oils, say some, or adding to the gas condensable hydrocarbon vapours having approximately the same vapour tension as naphthalene, on the ground that there is not usually in the crude gas a sufficient proportion of such vapours. But if this be correct, what becomes of the naphthalene during the major portion of each year, when the atmospheric temperature is lowest. It can hardly be said that atmospheric conditions affect its production. Ought it not rather to be inferred that these conditions materially affect its removal in the condensing plant, in disproof of the assertion that the crude gas does not contain sufficient hydrocarbon vapours capable of dissolving it. There may be tar so indifferent in quality as not to yield on distillation a sufficiency of the necessary solvents; but to generalize from this would only be misleading, since bad tar may mean bad carbonizing. It should be our aim to remove the naphthalene in the ordinary process of manufacture; and seeing that the gas has to be subjected to a kind of refrigerating process after it leaves the works, by which it is caused to part with its naphthalene to the annoyance of the consumers, what harm could result from its undergoing such treatment at the works as a part of the condensing process—which in any case requires to be considerably extended—so as to make it stable under any conditions to which it may have to be subjected in the distributing mains and services?

Concurrently, however, with these naphthalene deposits, it is not unusual to find a falling off in the yield of tar and ammoniacal liquor, so that they may be regarded—like cyanogen, if, as there is reason to suppose, this be formed at the expense of ammonia—as of suspicious origin, and their occurrence as a kind of danger signal to warn the gasmaker that the proper temperature for carbonizing is being exceeded. By proper temperature is meant that which is productive of the best all-round results—it being assumed that our business is to produce these rather than to pursue the manufacture of gas regardless of residuals. The latter course, if deliberately followed, is little short of suicidal, because it can be shown that a high yield of good gas is not incompatible with a high (if not a record) yield of residuals. At one of the Birmingham works, for example, where the carbonizing is not conducted on the most modern lines, the production from by no means the best North Derbyshire coal for years exceeded 10,000 cubic feet per ton of 17-candle gas, with about 11½ gallons of tar, and nearly 40 gallons of ammoniacal liquor of 10-oz. strength—the average yield for the last half year having been 41·5 gallons. Cyanogen is only found in small quantities in the gas made at these works, where, also, hardly a flake of naphthalene has ever been seen. Our aim should be the employment of the most economical system of carbonization unattended with production of naphthalene. The action which has been taken by the Southern District Association in the formation of a Committee to investigate this subject of naphthalene is one greatly to be commended.

The increased attention which has of late years been given to the important subject of capital outlay has already borne substantial fruit. In many cases capital has been nominally increased through the acquisition of the undertakings by local authorities at prices considerably in excess of the actual expenditure upon them, and also by conversion of companies' stocks. Nevertheless, and allowing for the latter only, the Board of Trade returns show that during the last nineteen years the average capital outlay per 1000 cubic feet sold, of the whole of the undertakings, has been reduced by about 18½ per cent. This reduction, which has in some individual cases been much exceeded, has been brought about in a great measure by the adoption of cheaper methods of construction, and despite advances in the prices of materials and labour. The saving to the consumers which it represents in reduced capital charges, amounts to about £750,000 sterling per annum.

An interesting comparison is afforded by the capital employed by the gas and electric lighting industries respectively.* The latter, at the end of 1900-1, had a capital of £27,934,239, compared with £102,924,220, or, deducting what has been added by conversion of stocks, £86,148,000, or thereabouts, for gas lighting. At 3½ watts per hour for 1 candle, the electric light output was equal to 56,046 million candle-hours; while the gas output, calculated on a yield of 15 candles per foot by incandescent burners used under ordinary pressures, was equal to 2,106,277 million candle-hours. Electric lighting has thus a capital equal to 32·42 per cent. of that for gas lighting, with an output of only 2·66 per cent., which means that for every £1 invested in gas lighting, upwards of £12 are required for electric lighting to produce an equivalent of candle power. At this rate, the Corporation of Birmingham, for instance, would have to face an expenditure on electric lighting plant of £30,000,000 sterling in order to distribute the same candle power as can be yielded by its present gas supply. And yet there are those who say that electric lighting ought to be so encouraged and developed as to obviate the necessity for additional gas plant! The fact is that, under the present conditions, electric lighting for domestic purposes is, as regards economy, hopelessly beaten by the incandescent system of gas lighting.

The electric arc system of street lighting continues to disfigure many of the Metropolitan thoroughfares. Even in London, however, testimony is not now wanting to the superiority of gas as a street illuminant. It will be remembered that some years ago experiments were made at the South Foreland with the object of determining the relative merits of gas, oil, and electricity for lighthouse purposes. The official report on these experiments was felt to be inconclusive. Yet enough was known of the results obtained to carry conviction of the superiority of gas, as compared with electricity. Quite recently, this judgment has been confirmed in a remarkable manner by an impromptu experiment, so to speak, carried out under the observation of all London. The dense fogs which occurred last autumn were a sufficiently severe test of the value of any illuminant. It is gratifying to know that the verdict of both the Press and the public was entirely in favour of gas, which, as was clearly demonstrated, has in its present aspect become more than ever necessary for safe and effective street lighting.

There are many satisfactory indications of increasing alertness on the subject of active competition with electricity for street lighting; and it is clearly desirable that, on all possible occasions, the efficiency and economy of incandescent gas lighting should be fully displayed. As a contribution to what is being done in this direction, it may be mentioned that for the special lighting in the neighbourhood of the Town Hall and Council House, Birmingham, the substitution of Kern incandescent

* Board of Trade Returns, and Garcke's Manual of Electrical Undertakings, &c.

burners, consuming 4 cubic feet of gas per hour, for the original 10 feet per hour Bray flat-flames, has resulted in a saving of about 45 per cent. in the gas consumption, or, in round figures, 3 million cubic feet per annum, for an expenditure for mantles and extra attendance of less than £100 per annum. At the same time the amount of light has been greatly increased; 388 burners, each yielding a light of from 90 to 100 candles, taking the place of 285 burners, each giving a light of about 30 candles.

One indirect result of the introduction of electric lighting has been to bring into greater prominence the advantages of gas for heating and cooking. At the same time, the great transition from steam to gas for motive power has added largely to the consumption in every manufacturing centre; while the prepayment meter —with which the name of Mr. R. W. Brownhill, of Walsall, its original inventor, is inseparably associated—is now the means of bringing it within the reach of the smallest consumer. It may thus find a place in almost every household, and in connection with almost every industry; and although for fuel purposes it may be threatened with competitors, enough is known of these to assure us that the fault will be ours if its position be not in this respect not only maintained but strengthened. Competition, from whatever source, requires to be met by business methods. Why should not the advantages of our gas be advertised, as in America, by gas undertakings in combination? Why should not consumers, not alone of one—the prepayment class—but of all classes, be canvassed for, as has been done so effectively by Mr. Witten of the Gorleston, Gas-Works, who, as he informed us recently, has by this means increased his business during the last six years by 120 per cent.?

In connection with the various schemes for power distribution which are now occupying attention, it has been observed—and the observation is worth repeating—that there is already a very effective system of such distribution in active operation throughout practically the whole area supplied by every gas undertaking, and at a very moderate cost. For instance, the Birmingham undertaking supplies an aggregate of about 19,000-horse power, consuming upwards of 800 million cubic feet annually; the revenue from which for the last complete year amounted to over £88,000. This, be it observed, is entirely the growth of recent years; and it could scarcely have been acquired by any separate system of distribution for power purposes. The strength of the position lies in the various purposes to which gas can be applied—the one assisting the other to cheapen production and distribution. The great development of additional uses for gas, occurring concurrently with the fading away of expectations that had been excited by its youthful rival, electricity, restored public confidence in its fortunes—at one time rudely shaken. Then followed increased activity on the part of local authorities; so that the substitution of public for private enterprise is almost as much a circumstance of recent times as is the general application of the sliding-scale of dividend to companies when applying for further parliamentary powers. During the last nineteen years or so, considerably over 100 transfers of gas undertakings to local authorities have been authorized; while since the first sliding-scale enactment in 1875, nearly 200 companies have been brought under this legislation.

What has the sliding-scale of dividend done for the gas industry? For one thing, it has secured to private enterprise a long immunity from harassing attempts at legislation—the public being fully satisfied with it as a reasonable and equitable arrangement. This, of itself, is a success of which the author of the sliding-scale may feel justly proud. But a further claim for it has recently been made—that "it has urged to cheaper methods of production, greater attention to residual products, more careful expenditure of capital, and efforts towards popularizing the use of gas. . . . Accepting this as true of the 194 companies at present working under the provisions of the sliding-scale, what, it may be asked, is the position of the 499 undertakings which know no sliding-scale? Have they not been urged to cheaper methods of production, &c.?"* What share have they had in the great advancement of the industry during recent years? Have they done more or less to promote that advancement than the sliding-scale companies?

These are questions that require to be answered if the value of the sliding-scale as a stimulating agency is to be rightly appraised. These questions Mr. Jones, in the paper from which I have quoted, does not apply himself to answer; nor does he even attempt to recognize the fact that the sliding-scale companies are not responsible for one-half of the gas supply of the United Kingdom. Instead, he classes this legislation with the prepayment meter and the Welsbach burner as of universal application, and puts to the credit of its influence all recent improvements in gas manufacture. I have elsewhere combatted these pretensions, and do not wish to occupy your time with repetition. There is, however, one well recognized—although not infallible—test of efficiency, Mr. Jones's appeal to which has hitherto passed unnoticed. Referring to the great growth of gas consumption during the previous four years, as shown by the Board of Trade returns, he expresses his conviction that this was greatly affected by the three causes above mentioned, of which the sliding-scale is one. These returns do show, as he points out, an aggregate increase for the four years of 21¾ per cent. But if the companies and local authorities returns be compared separately, what do they show? The former, that the sliding-scale companies which are included in both the 1895 and 1899 returns, increased their business by 20·374 per cent., which is under the average of all the undertakings by nearly 1½ per cent. On the other hand, the local authorities returns show that the business of the undertakings which are included in both the 1895 and 1899 returns, was increased during the same period by 23·95 per cent., or nearly 2¼ per cent. above the average of all the undertakings, and fully 3½ per cent. above that of the sliding-scale companies. The following are the figures, which may be commended to all who decry "Municipal Trading" in regard to gas supply.

—	No. included in both the 1895 and 1899 Returns.	Gas Sold in Cubic Feet.		Increase over 1895.	Percentage over 1895.
		1895.	1899.		
Sliding-scale Companies .	175	49,632,466,563	59,744,698,693	10,112,232,130	20·374
Local Authorities .	202	40,465,831,182	50,158,351,674	9,692,520,492	23·950

Of all recent developments either directly or indirectly affecting the fortunes of the gas industry, those of the gas-engine and the Welsbach burner stand supreme, and the one is almost the complement of the other; for so long as the lighting value of gas depended upon its illuminating power, there could not be complete identity of interests between various users of it. For lighting purposes, the candle power had to be kept up, if not increased, practically regardless of the extra cost of enrichment. On the other hand, there is for motive power or for heating purposes a choice of cheap fuel—at least, in normal times; and the cost of enrichment is an obstacle to the use of gas in these directions. The Welsbach burner reconciles these conflicting interests, and in doing so evokes, as if by magic, a light of surpassing brilliancy. The importance of this invention to the gas industry can hardly be over-estimated. It seems to have opened up for it a new future, the bounds of which are not visible within our horizon.

This emancipation from the necessity for a high illuminating power has, singularly enough, timed with the introduction of new and cheap methods of enrichment as substitutes for cannel. These, however, are hardly likely to be soon discarded. Carburetted water gas has proved of great service, not alone for enriching, but chiefly perhaps as a means by which large quantities of gas can be produced at short notice, with a minimum of labour and a comparatively small capital outlay and occupation of ground space. There is every probability of its use being continued for the production of lower qualities of gas, should the price of oil not stand in the way. The uncertainty of the latter hitherto makes it desirable that carburetted water gas should continue to be regarded as an auxiliary, rather than take a place as an integral part of the gas production. Or it should be possible so to arrange the plant as to admit of resort to benzol enrichment as an occasional substitute for oil.

Little or no alteration has been made in this system of gas production since its introduction into this country some ten or twelve years ago. Is this a reflection upon English gas makers, or a tribute to American inventive genius? Perhaps something of both; for, although admirably simple and effective, it can hardly be considered as perfect. A more complete utilization of waste heat is to be desired, as also greater uniformity of results. Oil gas makers know that the limits of temperature for obtaining the best results are narrower for oil than for coal; and these are not very easy to observe, except intermittently, with the present apparatus. The average candle power obtained per gallon of oil is thus low as compared with what can be obtained under the most favourable conditions. There are, moreover, various details of the plant which are certain to be improved when the time comes for gas makers to design this for themselves.

"Straight" water gas has now been added to the resources of the gas maker; and this is very suitable for incandescent lighting, owing to its comparatively high flame temperature. If introduced into the hydraulic or foul mains, it should pick up enrichment which would otherwise find its way into the tar-well—an effect which may also follow from Professor Lewes's plan of passing this gas through the coal-gas retorts. What appears likely to prove an additional advantage of the latter method is the cooling effect of the water gas, which should tend to prevent the formation of naphthalene. This should be doubly serviceable in the case of illuminating gas made from coke-ovens, which retains an inconveniently high temperature, owing to the absence of any cooling surface such as is provided by the ascension-pipes of ordinary retorts.

This combination of coal and water gas promises to be of considerable use in the endeavour to provide cheap heating gas. It should reduce the cost of production much below that of coal gas alone, and also lessen capital charges by reason of the comparatively small cost of water gas plant; besides economizing ground space. The calorific power of water gas being, however, very much less than that of coal gas, any mixture of the two must necessarily be inferior in this respect to the latter alone although equality may perhaps be restored by benzol or other enrichment. On the other hand, all recorded experiments tend to show that the calorific power of coal gas does not diminish proportionately with its illuminating power. In fact, Dr. Colman

* "Modern Practice in the Manufacture and Distribution of Gas." By H. E. Jones. See "Journal," Vol. LXXVIII., p. 971.

found, when testing gases which varied in quality from 16 to 18 candles or thereabouts, that some of those which gave the lowest illuminating power were actually the highest in calorific power.* This points to the desirability, as a means of reducing illuminating power, of drawing more gas out of the coal if possible, by reducing the weight, or extending the duration, of the charges, or using inferior coal.

This problem of how to reduce illuminating power without proportionately reducing calorific power, must henceforth occupy increasingly the attention of gas makers, seeing that illuminating power as an element of value is fast receding to the background. There is, moreover, already looming in the distance competition with some of those gigantic schemes of heat and power distribution to which slight reference has already been made, which have engaged the attention of Parliament during recent years. To be prepared for this, we stand in need of all available resources; and Mr. Livesey, in his address to the Gas Section of the Glasgow Congress last year, struck the right note when he declared for the removal or mitigation of legislative restrictions.† The present position of the gas industry is quite different from what it was in the halcyon days of such legislation. Then, restrictions might be borne, although the necessity for them might not be apparent; whereas they are now inconsistent with the paramount necessity of reducing cost to the consumer. Moreover, the purest gas in the world has not satisfied the fastidious who demanded it, for they now use the electric light. Provincial undertakings are, as a rule, much less burdened with restrictions than are the Metropolitan Companies; and it is worth noting that, during the whole period of the existence of the Gas Referees, there has scarcely been even an attempt to extend their jurisdiction. The influence, however, of Metropolitan Gas Legislation is felt far beyond the area of the Metropolis; and Mr. Livesey is fighting our battle as well as his own. We may well, therefore, sympathize with his bold and forward policy, and wish it complete success.

The future, however, is, after all, very much in our own hands. It will be largely influenced by the use which is made of the facilities which are at our disposal for the extension and consolidation of our business. Why, for instance, should consumers be allowed to remain in doubt as to the advantages of incandescent lighting owing to the inconvenience they experience from defective burners, mantles, or fittings. The example which in this respect has been set by the South Metropolitan and other Companies of contracting for maintenance, cannot be too widely followed. Again, for the production of cheap fuel gas, is it probable that the existing retort systems will suffice, or will not carbonizing in bulk increase in favour? The latter should solve satisfactorily the labour question, which has always weighed as an incubus upon gas manufacture, and it seems to be peculiarly suitable for localities where there is a ready sale for hard or oven coke. In such localities, the distribution of gas as a bye-product need not be looked upon as an impossibility; while in any event every ton of hard coke put on the market by a gas undertaking should lessen the chances of competition with the metallurgist in the sale of residuals, and, what is perhaps of equal importance, reduce the quantity of gas coke made for sale. Since the reading of my paper to the Incorporated Institution of Gas Engineers in 1896, by which attention in this country was first drawn to this subject, much progress has been made with regard to it. America has shown the way in the adoption of the system for gas distribution; and we now have an example much nearer home. What is being done at Winnington can, I am persuaded, be initiated in many centres of British industry.

It is evident that the conduct of gas supply in all its now varied aspects must continue to afford increasing scope for the exercise of the highest technical and administrative skill and experience; and this conviction has given rise to much discussion as to how the gas maker should be educated or trained. May not a partial solution of this question be found in a more general recognition of the necessity for careful preparation for practical work of whatever kind? A sound knowledge of theory should precede practical training; and our educational system can hardly be considered complete until a full opportunity for obtaining this knowledge has been placed within the reach of all. Under modern conditions, the youth who, on leaving school, passes creditably through the scientific curriculum of one of our modern Universities, will probably have gained a lifelong advantage over the one who goes straight from school to serve a pupilage on a gas-works. Technical knowledge alone, however, will not suffice; and the practical training of the pupil should stand him in good stead—assuming that he be old enough to profit by it. It is the combination of technical knowledge and practical training which is really needed, added to administrative experience. For acquiring the latter, it is desirable that our future gas makers should have an early foretaste of that responsibility which must some day be theirs, and with which they may be gradually familiarized in proportion to their fitness, rather than according to their years. Nor should sympathy and encouragement be wanting to them, or the willingness to direct enthusiasm to useful ends, or opportunities for extending their professional knowledge, or, though last by no means least, adequate remuneration, without which it can hardly be expected that suitable recruits will be forthcoming. It is, moreover, important to recognize the fact that freshness, no less than experience, is essential to great enterprise. Let us therefore make such use of our young men that, having minds free from the rust of routine and red-tapeism, they may become fitted for the exercise of supreme control.

Let me conclude, gentlemen, by expressing my earnest hope that the work of this Association will be continued and extended, with increasing benefit to the great industry which claims our best and truest services.

At the close of the address,

Mr. GLOVER said he had been asked to propose a vote of thanks to their President for the splendid address to which they had just listened. The members expected good things; and they had not been disappointed. So many matters which were engaging their attention, and which were of deep interest to them, had been touched upon by the President, and touched upon to their good. They had not only listened, but they had learned; and they would carry away with them many suggestions which they would probably follow up in their practice, to the benefit not only of themselves, but of their undertakings. He had great pleasure in proposing a hearty vote of thanks to Mr. Hunt for his address.

The VICE-PRESIDENT (Mr. Charles Meiklejohn, of Rugby) seconded the motion, remarking that while he had been listening to the address, he had been struck by one thought, and it was this: Last year they had a President who was prepared with two addresses; and he felt, during the delivery of Mr. Hunt's address, that it was one (and he hoped this would commend itself to the members) which would very well serve for two years, instead of one. (Laughter.) The amount of information and practical experience given them by Mr. Hunt was quite sufficient to supply them with that and work for the next two years at least.

Mr. T. BERRIDGE (Leamington), in supporting the motion, said the members had heard a most admirable address, and one which would well repay careful reading at home.

The motion was carried by acclamation.

The PRESIDENT, in responding, said he was much obliged to the members for their kindness and for their reception of the address. He was sure they would not take Mr. Meiklejohn's feeling remarks to heart, but that they would look forward, notwithstanding what he had said, to a splendid address from him next year. He could only say with regard to himself, that it was a matter of increasing difficulty to know what to say in an address. He had been guilty of several addresses in his time; and therefore he was only too pleased if he had been able to produce anything at the present time which was worthy the acceptance of the members. It was probably the last one he would have to prepare ["No, no"]; and therefore it was all the more gratifying to him that the members had received it so kindly.

THE NEXT MEETING.

The PRESIDENT, in calling upon Mr. Maybury to introduce for discussion the question of inclined retorts, said perhaps the members would allow him to say that, through Mr. Maybury's kindness, it was hoped that the May meeting of the Association would be held at Great Malvern. Mr. Maybury had been kind enough to name the question of the visit to his Committee and to the District Council; and they had been pleased to say they would favour the visit, and welcome the members to their works.

Mr. H. P. MAYBURY (Great Malvern) then read the following paper, entitled

INCLINED RETORTS AND THEIR WORKING.

One of the first questions that is invariably put to me by engineers is, "What induced you to prefer inclines to horizontals?" The circumstances in my case were, perhaps, unique. I had to prepare a scheme for an entirely new works upon a new site. This, of course, necessitated the erection of a new retort-house; and therefore it was very little, if at all, more expensive to construct it for inclines than horizontals, seeing that what was expended in height was saved in width.

It is unnecessary to say that before I laid my scheme before my Committee, I considered the advisability of adopting the inclined system very carefully; and I find, upon reference to the report I presented to my Council at the time (April 24, 1899), the following:—

> Needless to say, I have seen good specimens of both types; and if I had a retort-house which would suit horizontals, I do not know that I should favour slopers. Having, however, as it were, to start *de novo*, and taking all things into consideration, I am persuaded that we shall be doing the right thing by adopting the inclined system. There are difficulties to be overcome; and I have seen installations which, if they were a fair sample of the whole, would be sufficient to justify any one in condemning the system. On the other hand, I saw settings which were working perfectly; the labour and wear and tear being reduced to a minimum. The greatest trouble I have noticed is the difficulty in some works of controlling the heats; and I certainly did see evidence of the creeping which I referred to in my former report. I was satisfied it was not the fault of the system, however, but of the particular setting; and I am quite prepared to take my share of the responsibility in recommending the inclined system. But I should much like your Committee to see both types at work, when you would be able to form your own conclusions.

I have seen no reason, after nearly a year's working, to regret having made this recommendation. On the other hand, I rather congratulate myself upon having done so.

It has been stated repeatedly that the erection of inclined retorts is more costly than horizontals. It may be under certain

* See "JOURNAL," Vol. LXXV., p. 1204. † *Ibid*, Vol. LXXVIII., p, 560.

conditions and circumstances; buf this is not my experience. I obtained tenders for both horizontals and inclines; and there was very little indeed between them—certainly not sufficient to make any appreciable difference to the ultimate cost of the work. Moreover, my works are not sufficiently large to justify an outlay of capital upon charging and drawing machines; and I wanted to reduce the amount of physical labour to a minimum.

I commenced working two settings of the slopers in January, 1901; and since August, I have worked inclines entirely. Some difficulty was experienced at first in getting the heats to my mind; but, thanks to the kind assistance and advice of Mr. Hack and Mr. Percy Winstanley, this is no longer a trouble. The heats are regular, and the carbonization all that could be wished. With Mr. Hack, I entirely agree that the fuel consumption in the producer, per ton of coal, is somewhat higher than with horizontals; but I have been able to sell 10 cwt. of coke per ton of coal carbonized, and with this I am satisfied. Obviously, this latter depends primarily upon the character of the coal used; and therefore it is somewhat fallacious to endeavour to make comparisons when different classes of coal are being dealt with.

In the "JOURNAL OF GAS LIGHTING" one sees it stated repeatedly that the yield of gas per ton, and the illuminating power, are not equal from inclined retorts to what is obtained from horizontals. All I can say is, in my own case, working the same kind of coal in both, my results are quite as good in yield and illuminating power as ever they were.

The question of the creeping of the charges is not so much to the fore as it used to be, although Mr. Carpenter still maintains that, with certain coals, creeping does undoubtedly take place. Now, during the last year, I have worked coals from North Stafford, Derbyshire, Yorkshire, Lancashire, and North Wales; and I have never seen any signs of creeping. I mention this because it has been stated that, by adopting inclines, we are restricting ourselves to a particular coalfield.

Having cleared up these points, and anticipated therefore, I trust, inquiries thereon, the whole controversy that has been, and is, going on in our excellent "JOURNAL" week after week is, after all, one as to relative capital costs, working expenses, and results. No two works on either system are quite comparable; and I think the suggestion made by the Editor of the "JOURNAL" in the issue of Dec. 3 last, under the heading of "The Manchester District Engineers and the Wakefield Inclined Retorts," worthy of adoption—namely, the formation of a Committee of Gas Engineers to make inquiries and report.

In giving the cost per ton of coal, it makes a vast difference whether the cost of unloading the coal is included; and what is more material is whether one is working two or three shifts of men. Take the figures given by Mr. Shoubridge, appearing on p. 1027 of the "JOURNAL" for Oct. 22. These show the total cost for three shifts, and including coal unloading and coke wheeling, as 1s 7·2d. per ton. In the "JOURNAL" for Feb. 11, p. 360, the Heckmondwike installation is referred to; the cost being given as 1s. per ton. In this case, it is stated that two shifts only are employed; and no coal unloading or coke handling are (apparently) included. The 1s. per ton here may thus, without difficulty, be made higher than the figures given by Mr. Shoubridge, when account is taken of the items left out in the Heckmondwike case.* These are two instances of the difficulty of comparison.

Personally, I should be delighted to reduce my working charges; but, in order to do this, I do not feel disposed to revert to a twelve-hour day in the retort-house. Flesh and blood are, in my opinion, of greater importance than (say) 1d. per 1000 cubic feet to the gas consumer. Of managers of works who have set back the hands of the clock of progress, and reverted to a twelve-hour shift, I should like to ask how their men manage to change from night duty to day duty, and whether they cease carbonization on Sundays. Unless carbonization operations are suspended or relief men provided, it would appear as though the men never get a clear Sunday off duty, and, worse, they are once a week on duty eighteen hours, which, in my opinion, ought not to be possible anywhere now-a-days. I hold no brief for workmen. Still, I feel strongly that labour has its rights as well as its duties; and the engineer or manager in charge of any undertaking, should try to act judicially and fairly between either his directors or his committee and his workmen.

Although I have undertaken to open this discussion upon inclined retorts, I should be exceedingly sorry if it went forth that I advocated this particular system because the labour in connection with carbonization was so reduced that I could ask my men to work 84 hours per week, instead of 56 as heretofore. What I most emphatically say is, that the system is all right, that it has come to stay, and that engineers (giving Mr. S. Glover's words an altered meaning) will certainly be putting their directors' or councils' money on the right horse in advising the adoption of inclines.

Discussion.

The PRESIDENT, in inviting discussion, said the paper dealt with one of the questions of the time; and he was sure there were many members who could speak upon it.

Mr. B. W. SMITH (Walsall) said, as the members were aware, he had not been in contact with inclined retorts for a considerable number of months; in fact, he had had no communication with his old works [Smethwick] as to the way the inclined-retort installation there had been going on. But he believed the retorts which he had the honour of showing the members in 1899, had done good work up to the present—they had been working right through without a moment's interruption. The question of inclined retorts had given him a considerable amount of thought. When he went to Walsall, as many of the members were aware, the whole of the works were reconstructed. They were working on the horizontal principle; and he was asked by his Committee whether they should not put in inclines. No. 1 retort-house was a very low roofed one, and had been constructed 25 years. No. 2 house had been built about ten years, and had horizontal settings and generator furnaces. No. 1 house was direct-fired. He saw that, to make sufficient gas, and to enable him to complete the work in a given time, he could not put down an inclined installation. Then he also felt that the expense of raising the old roof would be a serious item; and probably, when he started to move the roof, he would have to renew the whole of it. Then the walls were too slight to carry the superstructure; and the foundations were bad. The house, on the other hand, was admirably laid out for stoking machinery. Taking all these various points into consideration, he concluded, although he was strongly in favour of inclined retorts, that he was forced by circumstances to put in horizontals and stoking machinery. He was glad to say these had given every satisfaction; but he was unable at present to state the results of his working, because the period had been so short. However, he hoped to do so later on. In connection with inclined retorts, the questions had arisen as to the cost—the first outlay—the creeping of the coal, and the life time of the retorts. He felt sure, from the little experience he had had, that there was no fear so long as they obtained good material and workmanship. The whole secret in an inclined installation was its stability. If they had good work—a good framework and good internal settings—and could apply the heat slowly, then they would find that things would go on all right. About the application of heat to new inclines, a great many engineers had been too anxious to get high results at the start off. His own view was that the heating up should never be pressed. They should take no less than two months to dry the work, and be content with small charges and low heats. They would then get the whole of the plant properly seasoned, and then, after four months (say) the heats could be raised, and good results obtained. He believed in 20-feet retorts rather than 15-feet. They could get 6 or 7 cwt. charges burnt off in six hours. If they attempted with inclines to obtain a higher rate of working—that was to say, four-hour charges, as had been done with horizontals—they would get too much heat at the top. Regarding the controversy that had been going on as to the cost of working, this depended entirely upon the basis of calculation. Mr. Maybury had informed them that some people took twelve hours as the basis; while at modern works they now took an eight-hour basis. Then there was the question to be considered as to the amount of handling the coal underwent. In some cases, coal was carried by truck and tipped into the hopper; in others, it was lifted by an elevator; and in others, again, it had to be carted. Some people left out these items, so as to show they were not doing worse than other places. If they could only get a proper basis of comparison, they would find the system of inclines was bound to be cheaper than horizontals, and the lifetime the same.

The PRESIDENT: Would you kindly explain, Mr. Smith, for the information of the members, what you mean by that last remark—as to inclined retorts being bound to be cheaper.

Mr. SMITH: I say they would be cheaper in working; not in the construction.

The PRESIDENT: In the working expenses?

Mr. SMITH: Yes.

Mr. J. FERGUSON BELL (Derby) said he had some diffidence in joining in the discussion, as he had had no experience with inclined retorts; but he had been considering the question (in connection with extensions for his own Company) as to whether it would be better to put in horizontals or inclines. Well, he might at once say that he would have to have stronger facts given to him before he would forsake his first love—horizontals. The question of capital outlay had been raised; and this was a very important consideration. During his inquiries, he obtained the cost for ten arches, containing in all eighty retorts, each 20 feet long. The cost for the arches, retorts, ironwork, mouthpieces, and coke-elevators—all complete—came out to about £15,000. He also obtained an estimate for horizontals; and the cost of the inclines came out just about double that for the horizontals. Mr. Maybury did not tell them the amount of the capital outlay on his installation; and he for one would like to know that. The cost of inclines, so far as he (Mr. Bell) could see, worked out to £50 extra per mouthpiece, as compared with horizontals. Most works adopted 4¾-hour charges both for horizontals and inclines; and, therefore, he thought they might take it that each mouthpiece would carbonize in the year about 270 tons of coal. Now they could not estimate less than 15 per cent. for wear and tear and interest on capital; and 15 per cent. on the extra £50 per mouthpiece for inclines came to £7 10s. each per annum. If they divided this £7 10s. by the 270 tons, they got 7d. per ton of coal carbonized; and that was the cost for the extra capital outlay. This was an important factor. Then the question of wear and tear came in, and he had no doubt in his own mind that the wear and tear on an inclined-retort installation was much greater than on ordinary horizontals. Further, he thought the saving that was often put down to inclined retorts was in large measure due to the elevators

* A letter on this subject, from Mr. A. F. Goodson, the Manager of the Heckmondwike Gas-Works, appears in our "Correspondence" columns to-day.—ED. J.G.L.

and conveyors. For instance, in his own works, they put down a coke-conveyor, and reduced the expense 4½d. per ton by means of that apparatus. Now if they had put in inclined retorts, it would have been necessary to have had coal-elevators and coke-conveyors; and by them they would have reduced the expenses very considerably—all of which some people would put to the benefit of the inclined retorts. He did not condemn inclined retorts. But there were two sides to this question; and he did not think the last words had been said with reference to horizontals and machinery. It was a question well worthy of consideration; and they were obliged to Mr. Maybury for bringing the subject forward, because it would prepare them for the visit to the Malvern Gas-Works, when they would be able to judge for themselves of the author's installation and its operation.

Mr. T. Glover (Norwich) said this matter was also of interest to him at the present time; and he had been looking deeply into it lately. He found it beset with many questions which it would be well to settle in their minds before they changed over from one system to another. He thought the members had evidence when they visited the West Bromwich Gas-Works, of a house being well worked by simple machinery; and it had been referred to by Mr. Hunt in his address. Well, that was an example of a house giving excellent results with horizontals; and he did not think it could be beaten, so far as gas making was concerned, by any inclined retorts that had yet been put up. But there were circumstances under which they were almost compelled to adopt inclines. On some old works where there was not room to get sufficient gas-making plant, and it was undesirable to change over to a new site, it would be found that a good deal more gas could be made with inclined retorts on a given area than with horizontals. With regard to the question of capital expenditure, in the main he agreed with what Mr. Bell had said; but he would draw attention to this, that the expenses were not doubled for an inclined installation as compared with horizontals, because the house was practically the same whether it was for inclines or horizontals. Mr. Maybury said the increased height was compensated for by the reduced width; and he (Mr. Glover) thought they might take that to be roughly correct. So the house would be the same whether inclines or horizontals were adopted. He had been working out the relative costs for plants making 3 million cubic feet of gas per day; and he found it would cost £43,400 for inclines and £27,200 for horizontals—a difference of £16,200 in favour of horizontals.

The President: Does that include machinery?

Mr. Glover: Including machinery. Taking the wear and tear, this was where the question came in: What percentage should they take? Here they were beset with another difficulty; and it all depended upon what they could raise capital at. Some raised it at one figure, and some at another. Mr. Bell had fixed 15 per cent. But he (Mr. Glover) did not think they would be right in taking 15 per cent. Suppose they took 10 per cent., if they effected 6d. per ton saving with inclines, the two things came out about the same.

Mr. Bell: My figure was 10 per cent. for wear and tear, and 5 per cent. for interest.

Mr. Glover said he did not think they ought to take 10 per cent. on the increased expenditure on inclines. They would not take 10 per cent. on arches, or hydraulic mains, or on pipes. They might take 10 per cent. on machinery. But a great deal of the cost was bricks and mortar and foundations; and therefore he thought it was rather unfair to the inclined system. This matter was one which was well worth debating. He noticed in Mr. Maybury's paper that he mentioned the question of creeping. Well, he (Mr. Glover) did not think that in the Midlands there was any need to fear creeping. With certain Durham coal, what was called creeping did occur. The coal assumed a condition of flux in the early stages of carbonization—a viscid condition—and flowed down the retorts. It was not a question of the coal shifting. It got into a treacly condition, and the whole flowed down the retort. This creeping did occur with certain coal. Mr. Drory, of Berlin, had given them an interesting table in the last issue of the "Journal," and mentioned that with two coals he had found creeping, but he had not with a large number and variety of other coals. About fuel, it was gratifying to be assured that the fuel consumption was no greater with inclines than with horizontals. If Mr. Maybury could sell 10 cwt. of coke, they might be sure the fuel consumption was not a very extravagant one. There seemed to be so much radiation from inclined settings, especially on the charging-stage, that one feared the fuel consumption would be considerable.

Mr. J. T. Lewis (Wellingborough) said he had had no experience of inclines. His experience had been altogether with horizontals, and hand and machine work. First of all, with regard to the comparisons that were made with the one type of retort and the other, he thought very often a mistake had been made on the part of the advocates of inclined retorts, by endeavouring to show too much, inasmuch as their comparisons had been made to a large extent with some old and almost obsolete forms of settings, and a small number of retorts in a setting, Therefore the results were more in favour of inclined retorts than they would be if the comparison was made with some up-to-date settings. Then, again, as had been pointed out, advantages were attributed to inclined retorts which really were derived from the coal-elevators, large coal-storage hoppers, coke-conveyors, &c. There was no doubt advantages had been given almost entirely to the settings themselves that ought to have been divided, and given to a considerable extent to the items he had named. Taking his own case, he claimed that, by having given up hand working and using manual machinery, he had effected a great saving; but to say that manual machinery had effected the whole of the saving would be misleading. They drew the coke through the stage into the basement, where it fell into coke-waggons. These were run to the boot of the elevator; and one man was able to look after the whole of this and the engine. There was thus a large saving on the coke labour; and the same would apply to quite as large an extent to a coal-breaker and coal-elevators. He emphasized what the President had remarked in his address regarding the credit due to Mr. John West in connection with the machine working of retort-houses. He also agreed that what was wanted was some standard by means of which gas engineers could compare the various types of settings. Up to the present, they had heard a great deal about the saving effected in labour by the inclines; but, as had been pointed out, labour was one thing, but not everything. They wanted to know what really was the difference in the yield of one class of setting over the other. Mr. Maybury had told them he had got as good or better results with the inclines. Now what he (Mr. Lewis) wished to know was whether the setting, the furnaces, and the general arrangements were the same as Mr. Maybury had in use in the older portion of the works. They wanted to know about the labour, the yield of gas, the amount of coke used as fuel, and the capital expenditure on the two kinds of settings. When they had all such figures as these, then they would be able to work out the cost per ton of coal carbonized, and the cost per 1000 cubic feet of gas sold. He was interested in reading in the "Journal" this week the communication from Mr. Drory with regard to the results obtained in Berlin, because there he thought they got a proper comparison between one class of settings and another, so far as it went. It did not, however, go far enough, inasmuch as they did not get the items he had already mentioned. The saving effected in labour alone by inclines over horizontals and machinery was 4·8d.; and then, in the other works, there was an additional saving of 2·03d. by the use of a coke-conveyor, which proved the point he (Mr. Lewis) had previously raised. But he did not think with retorts of the size given by Mr. Drory they could expect to get the best results by machinery. The size he gave was 21 in. by 13½ in. by 9 ft. 6 in. All he (Mr. Lewis) could say was that 13½ inches high was not adequate to get what he considered a full charge in the retorts by the use of machinery. Therefore, if these retorts had been 22 in. by 16 in., they would have been able to get a larger charge of coal into them, and so reduced to a considerable extent the difference between the machine-charged settings and the inclined retorts. He was surprised to hear Mr. Maybury say he had been selling 10 cwt. of coke per ton of coal carbonized, because, from information he (Mr. Lewis) had had, it was thought a much larger percentage than this was used in the inclined system.

Mr. F. A. Winstanley (Rotherham) said he had had some twelve years' experience with inclined retorts, five of them having been at Rotherham. When he went to Rotherham, unfortunately, he was under that bane of all gas engineers—the consulting engineer. (Laughter.) Had he been the responsible engineer, he did not think he should have adopted inclineds. The results were comparatively as good as with horizontals; but they could not let the inclines "free-wheel" as they could horizontals. There was no doubt they reduced the labour of the working man, and put it on to the gas manager. (Laughter.) He was sorry Mr. Smith rose before him, because he had voiced his opinions to the T. He also would like some standard whereby they could compare the costs of the inclines and the horizontals. He remembered at the last Manchester meeting there was a big discussion on the subject; and the difference in the charges which various managers put down was perfectly remarkable. Some simply included the coal, and put that down as the cost per ton of coal carbonized (laughter), while others, on the other hand, included everything; so that really no man could compare with another until some standard was suggested. As to the creeping of coal in the retorts, he had had a great deal of trouble. He might say his works were situated practically on the pit-mouth. They used large double-screened coal; and in the dry weather, they had little or no difficulties in maintaining even charges in the retorts. But when they had wet weather, he found he might just as well chop the retorts in two so far as the charges were concerned. They could not get them to run down in any way, and then there were stopped pipes and bother all round. When the charges did run down evenly, and everything was going on sweetly, the gas manager could take two or three days' holiday. Speaking generally, he certainly preferred the horizonal system of retorts; and as to the fuel account, the amount of fuel used for the horizontal retorts at Rotherham (which, by the way, were on the open-fire system) was something like 25 per cent., and on the inclines, with Winstanley's regenerator furnaces, about 16 to 18 per cent. The saving in fuel quite justified one, so far as the fuel account was concerned, in adopting the inclined system.

Mr. S. Meunier (Stockport) said that, like most of the previous speakers, he had had no practical experience of inclines. He had been watching the system for a number of years, and he had taken every opportunity he could of looking round, and comparing notes and trying to get to the backbone of the matter, because when they extended the works at Stockport, they naturally wanted to get the latest and most suitable type of plant. There were

several reasons why his opinions at present leaned to inclined retorts. In his case, he had an old house with very obsolete settings—some of them with only five retorts in a bed. They could put in machinery; but if they did, it would simply mean, in the event of anything going wrong with the machinery or with the men, that they would have absolutely all their eggs in one basket. They were therefore likely to fix on inclined retorts. Although the President had pointed out in his address that stoking machinery was not so liable to go wrong as elevating and conveying machinery, yet means could be taken to have the storage of coal sufficient, so that, in the event of a breakdown in the elevating and conveying plant, it could be rectified without stopping work. Another point was that, if he went in for inclines, he certainly would not be able to put in 20-feet retorts. In the Continental practice, the engineers swore by the shorter length as against the usual English practice of 20 feet. He would not be able to get 20-feet retorts into the house he referred to, as they had in it an immense main flue embedded in a large mass of concrete. It absolutely drove him to put down double settings of inclines, if they went in for them; and they would have to have a discharge-floor in the centre. In a 64-feet house, it was rather a bother; but he had been getting out plans, and scheming, to see whether it was possible to work these. He found he could manage it; but many points would have to be considered, especially the particular one of radiation. His Committee had granted him permission to put down a trial setting. He had got the thing pretty well in hand; and after he had had some twelve or eighteen months' experience with it, he would be able to judge much better whether any benefit was derived from it or not. He might say he was proposing to put twelve retorts in a double setting, with a generator in the centre. And he also proposed, in order to safeguard the men as much as possible, to insulate the whole of the beds and the mouthpieces, and the ascension-pipes. He did not know what the result of this was going to be. He was rather anxious to know. (Laughter.) At the same time, being an experimental setting, they were making it as experimental as possible. Instead of using ordinary retorts, he proposed going in for the built-up retorts—that was, the tiled. His experience with them in horizontal settings was that they were good, because they enabled them to make repairs as needed. They could even take out one or two of the retorts without taking out the rest; so that, if they answered with inclined retorts, this would be a distinct success. Another thing they were going to try was a tar-separator inside the hydraulic main. There were various other points which he hoped to look into and tabulate, and which would help him to form some sort of opinion as to the desirability of inclines over horizontals. When he had got this information, he should be pleased to hand it over to his brother engineers. Regarding the question of capital outlay, it appeared to him there was a great deal more uncertainty about it than there should be. One man put down quite twice as much as another said it was. If they went into these things carefully, he thought they would be able to come to a much closer point than they had done. The same thing happened in regard to the cost of working. He could not quite follow one or two of the speakers who thought that saving must have been put down to the settings which really belonged to the machinery. If gas managers kept their accounts as he naturally anticipated they did, he could not see why they should mix one with the other. He could not conceive anyone mixing up the saving of labour by the coke-conveyor with the saving of the labour on the stoking. These points required settling; and he thought such a Committee as had been suggested—to lay down lines for comparison as far as they could possibly be laid down—would be of great assistance; and he did think the lines could be got a great deal closer than they had been of late. In these comparisons, they had been working too much "on their own." He hoped the Committee would be formed, and that a great deal of good would come from it. In his own case, he did not think his capital expenditure would be anything like what Mr. Bell was afraid of.

Mr. T. Berridge (Leamington) said there was one little point, and it had nothing to do with the inclined system. Mr. Maybury rather posed as the friend of the working man because he had adopted the eight-hour system; but he (Mr. Berridge) thought the manager who adopted the twelve-hour system was a much better friend to the working man. The twelve-hour man came on at six and left about five. He had an hour off for dinner, and three-quarters of an hour off for breakfast; and he only did about the same work in the eleven hours as he would have to do in the eight hours. With the eight-hour shift, it was all sweat and rush. If the man went off at two o'clock, he called in the public-houses, and got in a worse state than if he stopped on the works. In his own case, they did not work on Sunday.

Mr. R. O. Paterson (Cheltenham) said he was not using inclined retorts. Consequently, he was not in the position of one who could discuss the question from the users' point of view. But there were certain aspects of the case which naturally occurred to the gas maker when thinking over the subject of carbonization. In the matter of inclined retorts, the carbonization of coal had to be considered in a somewhat different aspect from that in which it had to be considered under the operations of horizontal retorts. From that point of view, he never got any light at all from the users of inclined retorts. They had, of course, the old-fashioned system of horizontal retorts and the mouthpieces, and the coal was put in on the level, and there was the hydraulic main at the end of the ascension-pipe. That operation was well understood; and, according to the dip in the hydraulic main, so in proportion was the pressure on the interior of the retort. Well, that of itself, from the point of view of his practice, was a defective method of carbonization. He thought there should be no hydraulic main at all, and he had never used one, and hoped he never would. The works also which Mr. Glover had referred to—West Bromwich—had no hydraulic main. He (Mr. Paterson) had not seen any system of inclined retort working that was going to be more economical than the system in operation at West Bromwich. West Bromwich was, he was proud to say, a copy of Cheltenham. Therefore he did not want to refer to Cheltenham, because he had an example at West Bromwich. But the question of inclined retorts was not exactly one of putting coal in, and having the seal of the hydraulic main throwing a back-pressure upon the retorts. They had the inclined retort coming down on the slope, and the ascension-pipes going up vertically from the bottom. If they had a hydraulic main, whatever the hydraulic main dip was, they must have that amount of pressure at the lower end of the retort or ascension-pipe; and they must have that amount of pressure to overcome the dip of the hydraulic main. But what was the effect of the pressure upon the retort? There was none of the gas that was generated at the upper part of the retort that could by any possibility creep down to the lower end until there was an amount of pressure at the upper end to force the gas downwards—until it reached the point at which the pressure was sufficient to overcome the dip in the hydraulic. This was one of the most unhappy points about the inclined system. It clearly meant this, that they must be decomposing the gas which had been generated from the coal very seriously in the slow progress of propulsion down the inclined retort to the lower end, where the gas had to pass out to the ascension-pipe. If anyone told him that he made as much gas with inclined as with horizontal retorts, he should not dispute or deny it; but he should want some more information upon it. He was not approaching this question from the personal or argumentative point of view. It was a physical question; and he wanted to know something more from the gentleman who said he made as much gas from the one system as from the other. However, this was one of the points which weighed with him in his suspicion, and natural suspicion, of inclined retorts. Now, as to the question of cost, he was in the position of having to build at an early date a new gas-works, and he had to consider carefully, for the advice and information of his Directors, the general question of what their new works should consist of—whether water gas, inclined retorts, or horizontal retorts. He would leave water gas alone; but the question of horizontal *versus* inclined retorts was a carefully investigated one. And he was compelled, from all the information he could obtain at the time (which was a little more than twelve months ago now), to come to the conclusion that, on the point of economy of labour, there was not a single advantage that he could obtain from the past experience of inclined retorts—that was, compared with his present working. This perhaps was strikingly strong; but it was a fact. Before he left the works that morning, he got out some figures relating to eleven beds of eight retorts—that was, 176 mouthpieces; and the cost of working that number of retorts (including stokers, firemen, and coke wheelers, and there were half as many coke wheelers as there were stokers) was 1s. 5½d. per ton of coal carbonized. If he took away the coke wheelers on the basis of the figure given them by Mr. Bell—4½d. per ton of coal—it left 1s. 1d. per ton. This was the cost; and these figures he had to use in the inclined retort comparison. He did not therefore think there was any inducement for him to go to inclined retorts from this point of view. Another question which had some weight in his mind, although it might not be much more than a subsidiary one, was this, that, with the inclined-retort system, if the machinery broke down, they were helpless. They could not send a man up on to the stage to charge the inclined retorts by hand as they could with horizontals if the machinery failed. With horizontals, a stoker or a labourer could put the coal in without much difficulty; but they could not deal with inclined retorts in this way. Therefore, in this he saw no saving. In his annual accounts for 1901, he found that coal cost him an average of 19s. 9·21d. per ton; and he was selling gas at an average of 2s. 5·69d. per 1000 cubic feet. Part of this was, of course, for the high-priced gas in the first portion of the year, and part on the reduced price. However, there was the fact that, with coal at 19s. 9d. per ton, he was selling gas at 2s. 5½d. He did not know of any system of inclines where such kind of work would be possible. Whether this was due to his system of carbonizing wholly, or whether it was due to something else, he did not know; but he could say this, that, with these figures in mind, he felt unable to advise his Directors to touch inclined retorts. He had gone into the cost of installation—he knew that it was much more; but he had taken the working alone.

Mr. S. O. Stephenson (Tipton) said there seemed to be a good deal of difficulty in getting at the truth about these inclines. On some hands, they were told that the capital cost was higher, and that the same make of gas per ton of coal was not obtained as with horizontals. Others told them this was not so. Then as far as the cost of working was concerned, they seemed to be in a hopeless muddle; the figures given them varying considerably. Then in the working itself, there was a wide difference of opinion. He had had the advantage of seeing three or four installations of inclined retorts; and some of them did not work at all well. There were creeping troubles, and all that sort of thing. Then

when it came to discharging them, they required a tremendous deal of tickling; and the tickling was rather a laborious process. Mr. Smith and Mr. Maybury, he believed, claimed for the inclines that they worked automatically. At Edinburgh, he understood, it was suggested to put in little hydraulic rams so as to assist the charges out. If this was necessary, then they were better off with horizontals and machinery; anyway, with the latter they were getting a high make of gas per ton. Mr. Glover, Mr. Paterson, and Mr. Bell had been fully investigating this question; and all three had come to the conclusion that horizontals and machinery were decidedly the better; and therefore he supposed gas engineers must continue to wait for further information. Perhaps they would eventually come to vertical retorts and continuous working. He hoped that, when the members went to Malvern, they would learn something more on the subject.

Mr. J. GOULD (Stourport) remarked that at his works he had been using the regenerative system of horizontals for ten years very satisfactorily; and he did not think he could get any greater advantage from inclines.

Mr. W. LANGFORD (Longton) said that he was working horizontals and West's manual stoking machinery; and as far as they were concerned, the results were most satisfactory. As had been stated, the gas profession seemed to be in a hopeless muddle over this question; and he wondered whether the President would propose the appointment of a Committee to compile a tabulated report on the subject—something that they could regard as a standard work. He would be very happy to give particulars as to his manual stoking machinery on the horizontal system. It was high time they had some basis by which they could formulate an idea as to which was really the best system of carbonization.

Mr. C. MEIKLEJOHN (Rugby) said it seemed to him to be the unanimous desire of the members who had spoken that some definite basis should be formulated on which a proper comparison could be made; and he thought the idea of appointing a Committee to settle the lines was a much-needed thing. He had been thinking about Mr. Meunier's idea of starting a single setting of inclines to test the system; and it reminded him of the Irishman who took a single feather to sleep on, and he felt so sore next morning that he condemned feather beds ever after. (Laughter.) It seemed to him that inclined retorts had been adopted on such a large scale that careful examination ought to give the members reliable information, without having experimental settings for the purpose. He would propose that a Committee be appointed to formulate some definite basis for realizing the value or otherwise of the inclined system as compared with horizontals.

Mr. PATERSON reminded the members that Mr. Herring was going to bring the question of the appointment of a Committee before the Institution of Gas Engineers. If the Institution took it up, this would surely serve their purpose.

The PRESIDENT also thought that, if the Institution would take the matter up, it would answer the object that Mr. Langford and Mr. Meiklejohn and others had in view.

Mr. J. ANNAN (Wolverhampton), said that, being free-handed, he had taken the opportunity of visiting many gas-works where different types of retort-settings were in use. He was an old man now, and it was some sixty years since he was first put into a gas-works. His advice to young men was not to look at horizontals at all now; but to devote their energies to inclines. If the inclined retorts were well set, and had proper men to attend them, they would work satisfactorily. They were a great advantage to the workman; and with them a better class of man would be brought to the work. He sincerely believed the system was the right one; and in it young and ambitious engineers had their opportunity for doing something great.

Mr. MAYBURY, replying to the discussion, said that Mr. Bell had raised a very important point; but he did not think his statement should be taken seriously by the members. If he understood Mr. Bell correctly, he had obtained an estimate for ten settings of inclines and horizontals; and the figures were respectively £15,000 and £7500. He could hardly think that Mr. Bell had had tenders in each case for the same thing. Did he not mean that for the £7500 he only provided for the arches and retorts; but for the £15,000 he provided for the settings, hoppers, breakers, elevators, and all that sort of thing? Then, if that was so, the figures were not at all comparable. In his own case, he had ten settings of inclines, eight in a bed; and he also got tenders for manual machines and horizontals, with two coal-breakers and two elevators, and practically everything in duplicate. Mr. Bell would be surprised that the difference in the tenders for the two systems was only £820. The contract that was let for his inclined work included the ten settings of eight retorts, two coal breakers and elevators, coal-hoppers and chargers (both in duplicate), iron-work in the roof of the house, drawing and charging floors, coke-gantry, hydraulic hoist, &c.—all complete for £13,000.

Mr. BELL: That does not include the coke-conveyor.

Mr. MAYBURY: No, I have got a coke-gantry.

Mr. BELL: My figures include a coke-conveyor.

Mr. MAYBURY said his scheme provided for a method of dealing with coke which, in his opinion, was certainly as good as, if not better than, any conveyor he had seen. He had originally, in his specification, provided for a De Brouwer conveyor, one of which some of the members saw working so well at the Hague. Then he saw something else in England, not far from London, which took his fancy. There the coke fell out of the retorts into coke-waggons, and was then hoisted, by means of a hydraulic hoist, and dealt with on an overhead gantry. He thought this was better, and less complicated, than a De Brouwer conveyor for a small works like his. The £13,000 included the coke-waggons and the gantry, and the ironwork of the roof of the house, 127 feet long. So that Mr. Bell's £15,000 was certainly a long way out. He agreed with Mr. Smith entirely that a great deal depended upon the material and the stable way in which the work was carried out. Mr. Paterson raised an important point in regard to the machinery breaking down, and the difficulty of charging in such an event. That was why he (Mr. Maybury) put everything in duplicate; and he was happy to say that, although he had been working for a little over a year, he had not had the slightest trouble with either the coal breaking or the elevating plant. Mr. Glover had raised the point as to the creeping of the coal. When he (Mr. Maybury) was preparing the scheme for submitting to his Committee, he saw signs of creeping at one or more works in London; but he had not seen it anywhere in the Provinces, nor had he had any experience of it. He did not, as suggested by Mr. Lewis, stand before the members as an advocate of slopers. He only undertook to open a discussion at the request of their President. However, Mr. Lewis raised the point that the advocates of the system were in the habit (as he supposed) of comparing the work of old horizontals with new inclines. When he took over the Malvern works, they had generators in use; and in regard to the relative value of generators and regenerators, they had the statement of Mr. Alfred Colson that there was little difference in the working of the two. The only difference was the slight saving in fuel. He (Mr. Maybury) compared his generators with the inclined retorts. He worked the generators from 1895 to 1901; and he renewed them twice in that period. Therefore the results in his case were quite comparable—seeing that he was working the inclines with the same coal and under the same conditions as he was generators in those days. Mr. Frank Winstanley referred to the responsibility being put on the manager instead of on the workman. He (Mr. Maybury) was perfectly happy in taking his part of the responsibility. It did not, he could assure the members, weigh heavily with him. The credit for the suggestion as to the appointment of the Committee ought to be given to the "JOURNAL," because it was stated in an editorial after the Wakefield meeting of the Manchester Institution that there were so many different things to be taken into account, in arriving at a comparison between inclines and horizontals, that it would be a good thing to appoint a Committee to frame some basis on which comparison could be fairly made. He quite agreed with the suggestion, and said so in his opening. Mr. Frank Winstanley had remarked that stopped pipes were of frequent occurrence. He (Mr. Maybury) had had one or two stopped pipes with inclines; and he had had stopped pipes with generators. But not so many with the former as with the latter. Mr. Paterson was to be congratulated upon carbonizing with horizontals at 1s. 5d. per ton of coal. He (Mr. Maybury) only wished he could do it with inclines.

The PRESIDENT said the members were much indebted to Mr. Maybury for having brought this subject before the meeting; and he wished to thank him, on his own behalf and on the part of the members, for having prepared his interesting statement. The whole discussion proved how very desirable it was that all these moot points should be settled, as far as they could be, authoritatively. He was glad to hear a proposal had been made for a Committee to be appointed to go into the matter thoroughly, and to decide once and for all, or at any rate for the time, which was the best system—horizontals or inclines. He thought such a Committee should be made as representative as possible; and he hoped it would not be confined to a single body or a single Association, so that they might have from all parts of the kingdom a Committee representing a variety of experience. He also desired to congratulate Mr. Paterson upon his excellent working with horizontal retorts, and he (the President) sympathized a good deal with his suspicion with regard to inclined retorts. He remembered that this had haunted Mr. Paterson for a good many years. He (Mr. Hunt) could not forget a conversation he had with Mr. Paterson on the subject in the early days of inclined retorts; but he was not sure there was very much in it, for, although some pressure there might be, it did not follow that there was greater pressure at one end of the retort than at the other, and it did not follow that decomposition took place on account of the pressure.

Mr. PATERSON: Not through the pressure, but through the slow progress of the gas downwards from the upper part of the retort to the bottom, over the hot surface of the coal or coke.

The PRESIDENT said he did not know whether it was possible to time the progress of the gas from one end of the retort to the other. Within a certain number of hours the charge had to be burnt off, whether in an inclined or a horizontal retort; and he thought that the facts showed that from an inclined retort, when properly charged, there was no loss of gas and no loss of residuals. That the carbonizing results were such that they could not be excelled with the horizontal system, he was not saying.

Mr. PATERSON asked to be allowed to say that he remembered the first inclined retorts inspected by a body of gas engineers in this country. They were at the Kensal Green Gas-Works; and the Institution of Gas Engineers went there to see them, and viewed them with a great deal of interest. He remembered going on to the drawing-floor, and looking up the retorts, and finding festoons of carbon on the roofs at the upper end, and in the most

extraordinary quantity. He was assured the retorts were clean at the start of the charge. If so, where did the carbon come from? He maintained from the decomposition of the gas.

The PRESIDENT: No doubt from the excessive pressure in the retort. (Laughter.) However, he hoped all these questions would be carefully gone into, and decided one way or the other. He was only sorry that some of their friends were absent from the meeting from one cause or another. Among others, Mr. Hack was unavoidably absent; and he (the President) was sure he would have been able to give some interesting information as to the present working of his inclines, had he been able to be present. He could only conclude by thanking Mr. Maybury for his kindness in introducing the subject for discussion; and he hoped much good would result from it. (Applause.)

Mr. MAYBURY briefly thanked the President and the members for their appreciation.

High tea was afterwards served; and this brought to a conclusion a most interesting meeting.

FROZEN GAS SERVICES.

An article in a recent number of "Das Moderne Beleuchtungswesen" calls attention to the remedies which have been proposed from time to time for the freezing-up of gas services. Among the more prominent are the addition of vapour of spirit (alcohol) to the gas, and the removal of moisture from the gas by means of calcium chloride or a similar agent. But there are obvious objections to either of these remedies. Another course, which is more often resorted to, is jacketing the pipes so as to protect them from cold where they are exposed. This is a reasonable procedure, because freezing only occurs in places where the pipes are but little protected from frost, as, for instance, in the case of street-lamp services. But the writer of the article considers the following a simple and cheap means of avoiding the freezing of such exposed pipes. At the point where the service issues from the ground or wall into the open, a considerably wider portion of pipe is inserted. For instance, with a $\frac{3}{8}$ or $\frac{1}{2}$ inch service-pipe, the wide portion should be from 8 to 12 inches long, and about 1 inch in diameter. The wider length of pipe must be capable of containing the whole of the ice or rime which results from the freezing of the aqueous vapour in the gas passing through the service, and still affording a passage for the gas. The aqueous vapour is frozen out in this wider pipe, and hence cannot be deposited as ice in, and thus block, the after portions of the narrow service-pipe.

The principle underlying this method of overcoming the trouble of frozen services is a simple one. The gas leaves the works saturated with moisture at a certain temperature, and if it is subjected in the services to a much lower temperature, a considerable amount of moisture must be deposited. If the lower temperature is much below freezing-point, the moisture deposited will be frozen, and will eventually block up the service at the point where the gas is first exposed to this low temperature. Now, this point, as experience also indicates, is where the pipe leaves the earth or a relatively warm building, and passes into the open. By inserting at this point a length of tube wide enough to accommodate the whole of any ice which is likely to be formed, and still leave a passage-way for the gas, the blocking of the pipe by freezing can be avoided. For street-lamps, the principle has actually been applied, in that the service-pipe is commonly made throughout its length of far wider piping than is usual for other service-pipes. But where a long length of service has to be exposed, the writer of the article in question would avoid the expense of laying pipes of large diameter throughout, and put only a short length of wide pipe at the point where the service comes into the open. The cost of such a length would be quite small.

Readers may remember that the special advantage claimed for the arrangement of purifiers constructed under Mr. R. J. Milbourne's patent is that all exterior valves are dispensed with, and that no expensive outside foundations are required for centre-valves, the whole of which are extremely simple, and are self-contained within the purifiers. We learn from the sole makers (Messrs. C. & W. Walker, Limited, of Donnington) that they have lately received instructions to supply four sets of large size, and are negotiating for the erection of three others.

The presidential address delivered at the Philadelphia meeting of the Chemical Society by Professor F. W. Clarke appeared in a recent number of "Science." The author considers that the chief need of chemistry at the present time is the better organization of research. While fully appreciating the great work that is done by individuals working independently in the field of science, he thinks that collaboration and systemization are urgently required. He maintains that, either by public expense or by private enterprise, laboratories for research should be established in all civilized countries. By conference between them, the work should be so adjusted as to avoid repetition—each one reinforcing the others. Their primary function should be to perform the drudgery of science—to undertake the tedious, laborious, elaborate investigations from which the solitary worker shrinks, but which are, nevertheless, essential to the development of chemistry. Brilliant discoveries might be made in them, but incidentally, and not as their main purpose.

MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.

The Thirty-Second Annual Meeting of the Institution was held at the Mosley Hotel, Manchester, last Saturday. There was an exceptionally good attendance of members; and the proceedings throughout, both formal and technical, were of an animated character. Until the new President (Mr. Arthur Graham, of Mansfield) was called to the chair, Mr. CHARLES WOOD, of Bradford, the retiring President, directed the proceedings.

THE MINUTES.

The HON. SECRETARY (Mr. J. Wilkinson, of Sheffield) first read the minutes of the last meeting; and, on the motion of Mr. HENRY HAWKINS (Todmorden), seconded by Mr. W. SEVERS (Wilmslow), they were confirmed.

A LOSS TO THE INSTITUTION AND THE PROFESSION.

The PRESIDENT said that since the last meeting they had lost one of their members and one of the best-known members of their profession. He was sure they all felt that the death of Mr. William Carr had been a severe loss to the Institution and to the profession generally. He would ask the members to show their sympathy with Mr. Carr's family by rising in their places.

This was done in impressive silence.

NEW MEMBERS.

The HON. SECRETARY next read the nominations for membership, as follows: Mr. Joseph T. Broughton, of Rainhill; Mr. William Hill, of Stalybridge; Mr. A. J. Jackson, of Padiham; Mr. T. W. Tiplady, of Bakewell.

On the proposition of Mr. W. W. HUTCHINSON (Barnsley), seconded by Mr. J. S. NAYLOR (Manchester), the gentlemen named were admitted to membership.

REPORT AND ACCOUNTS.

The HON. SECRETARY next read the annual report and accounts. In the former, the Committee referred with pleasure to the continuation of the prosperity of the Institution. During the year, fifteen new members were added to the roll; but death had unfortunately claimed four old friends—viz., Mr. John Chadwick, Mr. William Carr, Mr. John Cockcroft, and Mr. Frank Barrett. Mr. Chadwick and Mr. Carr were both Past-Presidents; Mr. Cockcroft was one of the founders of the Institution; and Mr. Barrett was one of the most regular attendants at the meetings. There were, it was added, now 149 members. The meetings held during the year were also reviewed; and in the concluding paragraph the Committee congratulated the members upon the excellent attendance which had prevailed at the meetings during the year, and trusted that the growing interest of the younger members would result in a good supply of papers for discussion. The accounts showed a balance in hand of £36 4s. 2d.—the reduction of the balance as compared with a year ago being about represented by the honorarium which the members voted to Mr. S. S. Mellor on his retirement from the secretaryship a year ago.

The PRESIDENT said he thought the accounts were in a very favourable condition; and he was glad to see their Secretary had managed to reduce the outstanding arrears of subscriptions very considerably. It was a troublesome piece of work, and reflected great credit on the Secretary.

Mr. WILLIAM DUFF (Morecambe) moved the adoption of the report and accounts.

Mr. HARRISON VEEVERS (Dukinfield) having seconded, and Mr. W. W. HUTCHINSON supported, the motion, it was carried.

ELECTION OF OFFICERS.

The next matter was the election of office-bearers; and a considerable amount of time was consumed over the discussion of the appointment of Secretary.

Mr. ISAAC CARR first submitted the name of Mr. S. R. Ogden for the position of Senior Vice-President. The office, he remarked, was an important one in the sense that, all being well, the gentleman who was appointed would be their next year's President. Mr. Ogden was one whom the members all knew. He was the worthy son of a worthy sire; and he held a name which had been associated honourably with the gas profession now for decades past. He felt sure Mr. Ogden would be acceptable to the members; and he (Mr. Carr) took the opportunity of congratulating him upon his appointment to the office. He was confident that, when the time came for him to serve the Institution as its President, he would do honour to the position.

Mr. J. H. BREARLEY (Longwood) seconded the motion, endorsing heartily all that Mr. Carr had said respecting Mr. Ogden.

The motion was cordially passed.

Mr. OGDEN thanked the members for conferring this honour upon him, and Mr. Carr and Mr. Brearley for the nice way in which they had proposed and seconded the motion. He (Mr. Ogden) would do his best to uphold the President during the current year; and, if he reached the presidential chair himself, he would endeavour to carry on the work in the same way that it had been done in the past.

The PRESIDENT said the next business was the election of Junior Vice-President. It had been thought by the Committee that they could not do better than recommend the election of Mr. H. Townsend. He had done extremely good work as a

member of the Committee, and had laboured very hard indeed to render the meetings successful.

Mr. J. W. MORRISON (Sheffield) moved the appointment of Mr. Townsend; observing that those members who visited Wakefield were sure that in Mr. Townsend they would have a good man, and one who would do honour to the Association.

Mr. J. C. PENNINGTON (Colwyn Bay) seconded the motion; and it was unanimously agreed to.

Mr. TOWNSEND, in acknowledging his election, said he thanked the members very heartily indeed for their unanimous vote, as well as those gentlemen who had so kindly spoken on the motion. He should be only too pleased to follow in the footsteps of the able predecessors who had occupied the position he was now called upon to fill; and he hoped the members would not regret their choice.

The PRESIDENT said for the office of Hon. Treasurer, they had only one possible name. Mr. Thomas Newbigging had been Treasurer for so many years now, that there was no one whom they could even suggest to take his place.

Mr. CHARLES POTTS (Hyde) moved, and Mr. H. KENDRICK (Smethwick) seconded, Mr. Newbigging's election as Treasurer; and it was cordially agreed to.

THE SECRETARYSHIP—A LITTLE BREEZE.

The President said with regard to the secretaryship they were somewhat unfortunate in the peculiar circumstances that had arisen. When Mr. Mellor found it necessary to retire, they were very fortunate, he (the President) thought, in securing the services of Mr. Wilkinson as Secretary. He had made an excellent Secretary, and had worked exceedingly hard. If the members were of opinion that they had had a successful year, he thought that more credit was due to the Secretary than to anybody else for their success. They were only sorry that, under the circumstances of his removal to Sheffield (which they hoped would be of advantage to him in every way), he found it impossible to continue to act as Secretary. This being so, he (the President) thought they were doing exceedingly well in accepting the offer of Mr. Shadbolt, of Grantham, who had kindly come forward at a critical time and offered to take the secretaryship—at any rate, for twelve months. Mr. Shadbolt had done much for the Institution, and, as Secretary, he would perhaps have more work to do; but he (the President) was sure that he would do it in such a way as everybody would approve of.

Mr. R. HOOTON (Ashton-under-Lyne) said, while he had pleasure in proposing Mr. Shadbolt's election as Hon. Secretary, he might say that the members were sorry to lose Mr. Wilkinson's services. He did not think, however, that a more sociable or qualified member than Mr. Shadbolt it would be possible to select.

Mr. HARRISON VEEVERS (Dukinfield) seconded the motion. He remarked that, failing Mr. Wilkinson, he did not think they could have a better choice than had been made. He knew from bitter experience that the office of Secretary was a painful one. It contained for its occupant a good deal of anxiety; and the man who held it ought to have a thick skin. (Laughter.) At any rate, Mr. Shadbolt was very good natured, and that would go a long way.

Mr. HENRY HAWKINS (Todmorden) said that, with all due respect to Mr. Shadbolt, who was undeniably genial and good-natured, he did think that, Mr. Shadbolt having served in nearly all the offices of the Institution, they ought to go farther afield. For his own part, he thought that a member who had gone through the chair should stand aside, and give other members an opening to come forward. He did not say this with the slightest feeling towards Mr. Shadbolt. He was an old friend of his; and he respected him as much as any member of the Institution. But he should like to see some new members coming forward to take part in the work; and therefore he should move, as an amendment, that Mr. H. I. Robinson, of Mossley, be appointed Secretary.

Mr. A. F. GOODSON (Heckmondwike) seconded the amendment. He thought that Mr. Shadbolt's position at Grantham was too far away; and it was therefore out of place to appoint him to such a position as that of Hon. Secretary. He did think that, without making any unnecessarily offensive remarks, there was rather too much cliquism and a little too much stand-offism in the Institution; and he thought it was time this was broken into. If this amendment was carried, he thought it would be a blow to that feeling.

Mr. G. B. SMEDLEY (New Mills) had pleasure in supporting the amendment; but at the same time he did not agree with the last speaker as to there being cliquism among them. Nevertheless he thought Mr. Robinson a more suitable person as Secretary in view of his situation in the district. He was situated near Manchester; and he was within the radius of the majority of the members, and they could see and readily get at him at any time. Mr. Shadbolt he knew, and with all the pleasure imaginable; but he had gone through the various offices and the chair, and it was fit that someone else should be moved into the vacant official position.

Mr. W. W. HUTCHINSON (Barnsley) asked whether it was possible for the members to be informed of the reason that the Secretary was vacating the position at the present moment. He was old enough to remember that a certain large Corporation, which should be nameless, took a certain course with regard to a possible occupant of the secretarial office. Now was he to understand that a leading Gas Company (who were known as being enterprising) were taking a similar course to the Corporation that he had alluded to?

Mr. J. W. MORRISON (Sheffield) said he might say on behalf of his Company that he did not think they would object to Mr. Wilkinson continuing to hold the office of Secretary. When Mr. Wilkinson was appointed, he mentioned that he held the position; and he also said that he thought with the amount of work he would have to do in his new post, it would be hardly possible for him to carry out the secretarial duties in connection with the Institution. His (Mr. Morrison's) Directors had never suggested, nor had he, that Mr. Wilkinson should send in his resignation.

Mr. HUTCHINSON said he was very pleased with the information; and it was thoroughly satisfactory.

Mr. ARTHUR GRAHAM (Mansfield), the President-Elect, said they did not want to elect a Secretary that day who, perhaps in a month's time, might be told that he could not hold the post. This last year or two they had been placed in an awkward position in regard to the Secretaryship. They ought to know whether Mr. Robinson's Committee would be willing for him to take the post.

Mr. ROBINSON said he did not think he need ask them.

Mr. ISAAC CARR remarked that this subject was an important one, as in his opinion—having had some experience of the work of the Institution—the office of Secretary was the pivot on which the Institution revolved. The other officers were important in their way; but they were all in a great measure insignificant compared with the Secretary. One speaker had made some reference to cliquism. He did not quite understand the meaning of that. In his whole experience of the Institution, he had never seen anything of the kind; and he believed in the honour and integrity of the officers who were in charge of their affairs that day. This matter of the appointment of Secretary had, without doubt, been thoroughly discussed by the Committee; and the rejection of Mr. Shadbolt would be tantamount to a vote of censure upon them. They were fully alive—more so than the general body of the members—to what were the requirements of the Secretary; and having regard to the essential features necessary in the Secretary, he said that they had made, according to their knowledge, the best possible selection.

The PRESIDENT observed that the change in the Secretaryship had been a source of considerable anxiety to the Committee, to himself, and to the President-Elect. He had not the pleasure of knowing Mr. Robinson personally; and he might, so far as he knew, make a very worthy Secretary. But after going very carefully over the list of members, the Committee considered they could not have a man who would make a better Secretary, under present circumstances, than Mr. Shadbolt. Experience in a Secretary was more important than in all the other officers put together. Mr. Shadbolt had had that experience, he had done good work for the Institution, and he (the President) believed he would make the best Secretary at present available.

Mr. J. H. BUCKLEY (Formby) suggested that Mr. Wilkinson should be asked to take office for another twelvemonth.

Mr. WILKINSON said he was sorry to hear the name of the Sheffield Gas Company brought into this discussion. He could not imagine how such an idea had got out, that the Company had interfered with his freedom in connection with outside honorary offices. In consultation with Mr. Morrison, at the time he was appointed to Sheffield, he made it clear that he was Secretary of the Institution. At the same time, as he was changing from a 50 million to a 1000 or 1200 million works, he felt he was morally bound to devote the whole of his services to the Company. Therefore he decided to give up his work as Secretary of the Institution, rather than do it in a slovenly manner.

Mr. S. MEUNIER (Stockport) said that he was not present at the last Committee meeting; but he took it that Mr. Shadbolt had volunteered to take the office, because it was well within his memory and the Committee's that, when Mr. Wilkinson mooted the subject of retiring, it was suggested that they should recommend Mr. Duxbury for the position. He took it that this proposal had fallen through consequent, as in Mr. Wilkinson's case, upon the removal of Mr. Duxbury to a larger sphere of action. He did not think it was quite fair to suspect that Mr. Shadbolt had attempted to push forward. He had stepped into a breach and into a position that was onerous, and involved a large amount of work. He (Mr. Meunier) could not understand how the remark had come to be made that there was cliquism. He did not suppose Mr. Shadbolt was particularly anxious to get his friends to push him into a position of this kind; but he could understand, from his experience of Mr. Shadbolt, that he would be a man to come forward at a pinch and help the Institution.

The PRESIDENT said Mr. Meunier had expressed the position exactly. Mr. Shadbolt had come forward at a critical time to help the Institution out of a difficulty; and he felt personally grateful to him for doing so.

Mr. BREARLEY pointed out that Mr. Graham being President for the ensuing year, it would be a convenience to him to have the Secretary close at hand. In his (Mr. Brearley's) opinion, it would be wise to appoint Mr. Shadbolt to the position.

Mr. F. A. WINSTANLEY (Rotherham) said it had been remarked that Mr. Shadbolt had come forward to fill the breach; and they had also Mr. Robinson prepared to fill it. The simplest thing was to have both names put to the meeting, and vote upon them.

There were other speakers; but the foregoing indicates the course of the discussion.

The vote was then taken; and resulted in 35 votes being recorded for Mr. Shadbolt and 23 for Mr. Robinson.

The PRESIDENT said he was pleased Mr. Shadbolt had been

elected, but sorry that the election had been under such unfortunate circumstances.

Mr. SHADBOLT, in acknowledgment, said that Mr. Harrison Veevers must be credited with being a keen observer of human nature; for he was sure, if ever a man needed a thick skin, it was he (Mr. Shadbolt) while he sat there and heard the remarks of some speakers. However, he did not feel like withdrawing, for the reason that the Committee, at any rate, understood the position and understood his motive.

OTHER OFFICIAL APPOINTMENTS.

The PRESIDENT said the next business was the election of two members for the Committee; Mr. Townsend having been appointed Junior Vice-President, and Mr. William Carr having passed away. The names suggested by the Committee were Mr. Wilkinson and Mr. Prince.

Mr. JOSEPH NICHOLSON (Castleford) proposed, and Mr. HUBERT RUSSELL (Holmfirth) seconded, the election of Mr. Wilkinson and Mr. Prince.

An amendment that Mr. Wilkinson and Mr. Severs should be elected was moved by Mr. W. TAYLOR (Glossop), and seconded by Mr. JAMES LEE (Carnforth).

Another long discussion ensued; but in the end the voting was: For Mr. Wilkinson, 50; Mr. Prince, 48; Mr. Severs, 25. The gentlemen proposed by the Committee were thus elected.

Mr. HAWKINS next moved the re-appointment of the Auditors (Messrs. J. E. Lamb and W. Severs.)

Mr. GEORGE NIVEN (Cleckheaton) seconded the motion; remarking that their Auditors were "genial souls," and did their work well. (Laughter.)

The motion was adopted.

Mr. KENDRICK gave notice that, at the next meeting, he would move that the procedure connected with the annual election of officers be altered to correspond with that of the Gas Institute.

THE NEW PRESIDENT.

The PRESIDENT said they had got through the worst part of the programme; and his year of office was now at a close. For some things, he was sorry; for one or two others perhaps he was rather thankful. He should like to take this opportunity of thanking the members, especially the Committee, and more than anybody else their late Secretary (Mr. Wilkinson), for the assistance they had given him during the year. He was glad to think they had had a prosperous year. They had increased the membership at a rapid rate; and he thought they were now certainly second to none of the District Associations. He should look back upon his year of office with pleasure. His only regret was that he had not been able to do so much as he had hoped to have done. He had had a busy year in many ways; and he had done the best he could under the circumstances. In their new President, they had a gentleman who would fill the office in the best possible way; and he thought they might look forward to having a satisfactory year under his guidance. He was sure Mr. Graham would have the hearty support of all the members of the Institution.

Mr. Wood then left the chair; and Mr. ARTHUR GRAHAM, on taking it, was heartily greeted.

The PRESIDENT at once delivered his

INAUGURAL ADDRESS.

Gentlemen,—In accepting the office of President of the Institution, I wish to thank you most heartily for the honour conferred upon me. Naturally, I feel a certain amount of diffidence in occupying such an important position, following as I do many eminent and worthy predecessors. I sincerely trust your confidence may not prove to be misplaced, and that the high standard of efficiency to which the work of the Institution has attained may not deteriorate at my hands; but that rather, by the hearty co-operation of officers, Committee, and members, we may a year hence look back upon a term of continued usefulness and advancement.

The most sorrowful feature of the past year is the death of four of our members. Mr. John Cockroft was well known among us, not only for his long connection with the Institution—he being one of the original members—but also on account of his genial disposition, which those who knew him best appreciated most. Mr. John Chadwick was an old campaigner, and had rendered valuable service—both by contributions to our proceedings and in the conduct of the presidential chair. Another Past-President—and one who will be much missed at our meetings—is Mr. William Carr, whose striking personality and varied abilities made him almost indispensable to us. Mr. F. Barrett, although comparatively a young member, and of a somewhat retiring disposition, took a keen interest in all our proceedings. The removal from our ranks of such useful members cannot be other than a distinct loss.

The difficulty of providing new material for presidential addresses is so apparent to everyone, that no apology is needed for keeping to common-place topics. The question of raw material is one which appeals to the gasmaker's mind. Owing to the conflicting statements by different authorities at various times, one is puzzled to know how long our coal supply is actually likely to last; and it is to be hoped that the new Coal Commission may arrive at a conclusion somewhere near the truth. The following opinions will serve to show the desirability of reliable data on this head. In 1863, Sir William Armstrong placed the probable duration at 200 years; in 1865, Professor Jevons put it at 110 years; the Commission who reported in 1871 estimated for 360 years; in 1891, Mr. W. Cochrane considered 75 years nearer the truth; in April, 1900, Mr. T. F. Brown gave it as his opinion that 300 years' supply remained; while some pessimists anticipate a practical exhaustion within the next 50 years. How to reconcile the two extremes of 50 and 360 years, is scarcely within our province to-day. One thing is certain—viz., that sooner or later we shall experience a curtailment of our coal supply. Already we are meeting this to some extent by introducing materials other than coal for the manufacture of gas—notably, oil, coke, and water vapour. How far we may develop in this direction is somewhat uncertain; our plain duty being to devote our best energy to obtaining a higher value from our old friend coal while he is still with us.

One of the leading questions exercising the minds of gas engineers at the present time is the replacing of manual labour by machinery in departments hitherto looked upon as unsuited to mechanical treatment. The introduction and development of inclined retorts is chiefly responsible for this. A reference to the discussion on this subject at our Wakefield meeting in November last reveals such difference of opinion as renders it necessary for some standard of comparison to be arrived at; otherwise we shall make confusion worse confounded. In making comparisons of the cost of carbonizing, I think we shall all agree that old-fashioned and antiquated plant should be entirely ignored; the only real comparison can be between the inclined system and horizontals stoked by machinery. The relative merits of these two systems, however, cannot well be estimated with any degree of accuracy until the difference of opinion, and the methods of arriving at working costs in both systems, have been definitely expressed and placed upon an unmistakable basis. There can be little, if any, room for disagreement as to items of cost from the time the coal is deposited in the breakers to the discharging of the coke from the retorts. The first, and possibly the most variable, item is the handling of coal from the railway truck or boat, as the case may be, to depositing the same on the works. Peculiarities of site, proximity to railway or canal, and conditions of labour, all tend to upset any attempt at comparative estimates. The economical handling of coal by machinery is placed beyond question. Not so, however, with regard to coke, particularly in the condition in which it is discharged from the retorts.

Mr. W. R. Chester, in his paper on "Mechanical Transport of Material in Gas-Works,"* read before the Gas Section of the Engineering Congress at Glasgow in September last, stated, when speaking of coke-elevators, that the cost for wear and tear was nearly twenty times greater than that of the coal-elevator. This is a most serious consideration; for one can easily imagine instances where the introduction of machinery for this purpose may result in greater cost than by hand labour. The particulars given by Mr. Chester in the foregoing paper are very valuable, as showing, from an experience of six years or so, the actual cost of maintenance, along with the duty obtained from various kinds of conveyors and elevators. If we abstract from the summary the figures dealing with coke machinery, both hot and cold, and take out the average quantity of coke dealt with per year, the cost per ton for repairs and renewals for an entire mechanical equipment from the retort to the overhead coke-hoppers—viz., hot-coke conveyor, elevator, and top conveyor—works out as follows:—

Hot-coke conveyor	3·714d.
Coke-elevator	0·913
Top coke-conveyor	0·891
Total cost per ton for repairs and renewals	5·518d.

To this must be added interest on capital outlay, as follows:—

Cost of plate-belt conveyor	£2026
Do. elevator	819
Do. push-plate conveyor	553
	£3398

Interest on £3398, at 3½ per cent. = £119.

The maximum yearly quantity of coke dealt with by the foregoing apparatus would be about 30,000 tons, which would involve a capital charge at 0·95d. per ton.

Cost of repairs and renewals	5·518d.
Interest on capital	0·952
Cost per ton of coke handling	6·470d.

If we take the total of Mr. Chester's figures referring to coke—which figures are based upon the quantity of material handled, apart from any fixed period—the cost works out at 6·518d. per ton for repairs and maintenance only; so that the above estimate is well within the mark. In addition to the foregoing totals, the capital cost of screens, hoppers, and engines must be added; also the expenditure on power and attendance. Further, we may presume that no provision has been made, beyond the capacity of the hoppers, for storing coke, although, on the other hand, considerable saving must be effected in loading into carts, trucks, &c., as compared with hand labour. Possibly it is this heavy expenditure that has caused some engineers who have recently installed the inclined-retort system to avoid mechanical conveyors, and adhere to the older but simpler method. The cost of removing coke by means of barrows from a stage-floor retort-house, where the required height is also obtained for stocking purposes, cannot exceed 4d. per ton of coke for labour, as one

* See "JOURNAL," Vol. LXXVIII., p. 634.

man can comfortably remove 15 tons per day; while, judging from my own experience at Mansfield, 1d. per ton is an outside figure for maintenance and renewal of barrows. This shows a difference in favour of hand labour of about 1½d. per ton of coke—a small matter, but a balance on the wrong side.

For all practical purposes, where a comparison is to be made between either inclined working and machine working, or between two or more installations of the same character, the total cost involved from the coal-breaker to the coke-yard should be ascertained. This total should include all interest on capital outlay, repairs and renewals of all plant and machinery, all labour of whatever nature involved between these two points, and, if possible, the power used in driving whatever machinery may be employed. Comparisons on such a basis as this will certainly not be so easily drawn as from a hasty reference to the wage-book; but the extra trouble involved in working out the necessary particulars is very small compared with the satisfaction it would give.

Having deposited our coke in the yard is not, unfortunately, at the present time the end of our troubles. Anyone prophesying two years ago that such a substance as arsenic and the manufacture of glucose would have brought about such disastrous results to the coke trade as we now experience, would have been treated as a false prophet. Such, however, is the case; and the slump in coke has affected all manufacturers of gas. How long the present depressed state of the coke market may continue, who can say? Let us hope not much longer.

It is an old saying that "every dog has his day," and the turn of carburetted water gas would appear to have come again; for the slump in coke, along with the reduced price of oil, have once more brought this auxiliary to the front. When Mr. Porter comes to write his next paper on "British Water-Gas Practice," these factors will certainly bring about some important modifications in the comparisons he has made. With oil at 2¾d. per gallon, as against 4d. a year ago, and surplus coke as low as 6s. per ton in many instances, a reduction of 5·87d., or (say) 6d., per 1000 cubic feet in the cost of carburetted water gas is effected. I need scarcely point out the importance of this reduced cost, particularly if present prices continue.

No important modifications in manufacturing plant call for special attention. What effect Mond gas may eventually have on the industry is yet an unknown quantity. But whatever it may be, the tendency is certainly all in the direction of a low-grade gas; and the experiment of the South Metropolitan Gas Company is one which every watchful gas administrator will do well to keep in view. We are yet some distance off an 8-candle power gas supply, as in some instances in Germany; but events are steadily moving in this direction—in fact, we may consider that we are at any rate in the earlier stages of transition. Meanwhile, we are compelled to adopt means of enrichment in one form or another; and it will doubtless be some considerable time before we are generally freed from this costly encumbrance. A good cannel coal, where obtainable at reasonable rates, still holds a leading position among the various forms of enrichment, not in regard to cost alone, but more especially in its permanency or carrying power, and its value as a preventive of naphthalene deposits.

The naphthalene bogey continues to cause trouble in some quarters, although at Mansfield we have been comparatively free in our district of supply—what troubles we have had being confined to the works. One incident in this direction occurred during the last summer, and has some little bearing on the value of complete condensation. A contemplated increase in scrubbing capacity necessitated the bye-passing of the scrubbing plant; and to make up the deficiency, jets of liqour were pumped in at the top of the condensers (these being of the vertical tubular type), each jet falling unhindered down a condenser tube. As a consequence, condensation was more complete than before, and to my surprise and satisfaction the usual summer deposit of naphthalene in the gasholder connections entirely disappeared. Nor have we been troubled since.

Turning to the distributing department, we note a steady and constant development in the direction of cultivating business. Whether we shall eventually go to the extremes of American gas suppliers in recommending and advertising our business is doubtful. Still, there is considerable leeway to be made up before we can claim to be on a par with other businesses in our country, without in any way Americanizing our methods. The time has passed when any branch of public supply can, with any degree of success, allow itself to be dragged along by the course of events. Our duty rather lies in anticipating the wants and requirements of those we serve, by studying their convenience, and so rendering ourselves extremely useful, if not indispensable.

It is very comforting to the management to feel that some little adjunct, as a profitable fitting, &c., business, is helping to swell the remunerative income of the undertaking; but may not this very source of profit, if overdone, prove to be an obstacle to the development of our real business—the supply of gas? There can be but little difference of opinion now-a-days as to the correct policy of gas suppliers in regard to the provision of all kinds of gas consuming apparatus, from the humble flat-flame burner to the high-power gas-engine—viz., to supply the same by any method most convenient to the user that does not involve the supplier in actual loss, and, where possible, to remove all obstructions in the way of a probable new consumer, or the extension of business with a consumer already on the books. Nor should we rest here, but take all reasonable steps to secure the consumer getting as high a duty as possible from the gas he burns; in other words, not to rest satisfied with a provision of the necessary means of consuming gas, but to see that the various appliances are kept in a state of efficiency. The supplying and fixing of ordinary flat-flame burners free of cost to the consumer, also the maintaining, cleaning, and renewing of mantles in the case of incandescent burners, at a nominal charge, although in themselves unprofitable transactions, are calculated to do more in the way of satisfying the users of gas, and popularizing the supply than any amount of discount or similar inducements to prompt payment.

One very important result of cultivating consumption—more especially that for purposes other than lighting—is the equalizing of the demand throughout the year. Four or five years ago, it was not at all unusual to find the minimum week's consumption as low as one-fifth or one-sixth of the maximum. Compared with this, our minimum week's output at Mansfield is equal to half the maximum. If we have to thank our friends the electricians for one thing more than any other, it is the importance of the load-factor. This, in itself, more than repays the trouble and expense of cultivation.

Signs are not wanting of gas coming into its own again in connection with public street lighting. The experience of such cities as Liverpool, Bradford, Lincoln, and others, where the tide of electricity has not only been stemmed, but substantially set back, goes to show that the public are, after all, in a measure, amenable to reason; and no wonder, when the increased cost for an inferior service is taken into account. The fogs of the present winter would seem to have conspired to dim the glory of the electric arc to such an extent that we hear suggestions of oil-flare lights being called in to assist the fog-quenched arc rays in enlightening some portions of the first city in the world. For the credit of those concerned, one can but hope that this is an unfounded rumour; and if the admission of failure must be made, that this fair-weather luminary cannot discharge its liabilities under such depressing surroundings, its more sturdy relative—gas—should at least be allowed to assist. One thought impresses itself upon the mind in this connection—viz., the great gulf between nominal and actual efficiency. High nominal illuminating power is of little, if any, practical value unless it is accompanied by the power of diffusion.

It has for some time been generally conceded by the most prejudiced that incandescent electric lighting is many times more costly than incandescent gas lighting; but the electric arc has still been held up as the most economical high-power light unit. This, however, is likewise a thing of the past, thanks to the progress made by intensified incandescent gas lighting, which has given us units of light ranging up to 750-candle power, at a cost of less than 1d. per 1000 candles per hour for gas. This unit may be multiplied almost indefinitely, and be relied upon to diffuse a very large proportion of its nominal lighting duty.

The forthcoming coronation—which, by the way, is to be held at a season of the year least suited to the illuminations—may prove that gas has no more been ousted from the decorative than the useful sphere. We may leave it to our friend to play the part of "lightning change artist," while the more solid and permanent effects will, as heretofore, be derived from the old source. In this, as in other matters, a great deal depends upon ourselves; and there is little room to doubt that, looked after betimes, we have an interesting part to play in the general festivities and rejoicings of that occasion.

Taking a general survey, one is bound to conclude that the outlook for the future is both bright and promising. Changes are in store, and possibly in the near future; but whatever the requirements of this and succeeding generations may be, the adaptability of the gas industry to the needs of the times will, I feel quite sure, be such as to not only fit it for survival, but render it increasingly useful and indispensable.

At the close of the address,

Mr. Wood said he was sure they were all under an obligation to their President for his admirable address. He must have given a good deal of consideration to its preparation; and he had furnished the members with much food for reflection.

Mr. G. B. Smedley (New Mills) seconded the motion, which was unanimously carried.

Thanks to the Late President.

The President, having suitably acknowledged the compliment, said it was his pleasing duty to ask the members to pass a vote of thanks to their late President. He was voicing the members' opinions in saying that they had had a most successful year; and it had been a pleasure to be ruled by Mr. Wood.

Mr. Ogden seconded the motion, observing that he thought Mr. Wood had carried his work through in an exceedingly satisfactory manner, and they were all sorry, as a matter of fact, to lose him from his position.

The motion was heartily passed.

Mr. Wood said he was extremely obliged to the members. The year had by no means come up to the ideal he set for himself; but, for many reasons, he had not been able to give the time to the duties that he should have liked to have done. If what he had done had been satisfactory, he was very grateful.

Papers and Discussions.

The President said the next item on the *agenda* was the paper which Mr. Hudson prepared for their Wakefield meeting, but

which, owing to the length of the proceedings on that occasion, was adjourned to the present meeting.

Mr. E. H. Hudson (Normanton) read his paper as follows:—

THE CONTROL OF CHIMNEY DRAUGHT.

The subject of my paper has recommended itself to me in consequence of difficulties experienced, and therefore likely to occur to anyone in charge of a gas-works. It is a minor detail in connection with retort-house work; but as the whole is made up of units, it is one of those units which cannot be ignored.

I do not think that anyone will disagree with me as to the necessity of an engineer designing a chimney of such dimensions as to give sufficient draught under the worst atmospheric conditions. It therefore necessarily follows that there are times when there is a greater draught than is required. The draught of a chimney is regulated by the temperature of the waste gases at the base, air at the top, and its altitude. The following table (which I have the author's permission to make use of) shows the variation of draught, in inches of water-gauge, under different temperatures of escaping gases and of chimneys of different heights, with a constant of 60° Fahr. at the top:—

Temperature in Deg. Fahr.	Height in Feet from Grate-Bar Level to Top of Chimney.				
	40	50	60	70	80
250	·1400	·1750	·2100	·2450	·2800
300	·1688	·2110	·2532	·2954	·3376
350	·1944	·2430	·2916	·3402	·3888
400	·2172	·2715	·3258	·3801	·4364
450	·2372	·2965	·3558	·4151	·4744
500	·2556	·3195	·3834	·4473	·5112

With direct-fired settings, an increased draught is attended by quicker consumption of fuel, with attendant higher heats, but at the expense of fuel. With regenerative settings, the results are vastly different; and perhaps it will be well to illustrate the deleterious effect it may have by relating my experience.

Prior to 1899, direct-fired settings were the rule at Normanton; and as we possess a good chimney-stack, showing $\frac{7}{16}$ draught on the water-gauge, the question of draught was never a subject of much consideration. In April of that year, regenerative settings were introduced; and during the summer they worked very satisfactorily. In the autumn, however, we were visited by some strong gales; and it was then that I was confronted with my first anxiety with respect to them, as on going to the works one morning I discovered that the heats had gone down in an astonishing manner. On making a tour of inspection, I found that the same conditions obtained as had existed for some time. As we had rather limited holder room, my attention was then concentrated on getting the heats up, in which I succeeded by the evening. I was quite at a loss, however, to account for the phenomenal change. On the following morning, the same thing repeated itself. It was therefore glaringly evident to me that some new agency was the cause; and to find it out and deal with it was my set purpose. I may say that previously I had had no experience with regenerative settings.

Another tour of inspection was made, and all the arrangements were as before; but on reaching the clinker taken out of the fires that morning, it was found to be of a much more solid nature than usual. I then arrived at certain conclusions, and, to put them to the test, instructed a stoker to go round the fires at midnight and break up the clinker. Although the gale continued, the heats were normal on the following day.

These, then, were my conclusions: On clinkering at 7 a.m., the primary air and secondary air were being admitted in the proportions of 5·5 and 4·5 respectively. Although the draught was much in excess at the time, it for a period influenced both the primary air and secondary air equally; and consequently a much larger quantity of producer gas was made and consumed. This accounted for the rapid recovery of the heats on the previous day. Owing, however, to the more rapid consumption of coke, more clinker was formed; so that during each successive hour the amount of primary air taken in was getting less, and by the early hours of the morning nearly the whole force of the chimney was operating on the secondary air flues. Now if, to ensure perfect working, the admission of primary and secondary air required regulating to the proportion before stated, and as the same force obtained in the later stage when the proportion was as 2 to 8, it was inevitable that such a result as I had experienced would follow.

The results summarized were: Rapid recovery of heats after clinkering. Gradual formation of clinker base in producer; thus preventing or obstructing admission of primary air. Diversion of draught to secondary air flues. Diminution of primary air and excess of secondary air. Gradual fall in the heat of the settings after the clinker had become set. Coal badly carbonized. Less gas made during 24 hours.

Having conclusively proved, in my own mind, that the cause of the mischief was the temporary enhanced power of the chimney, a damper was at once fixed in the neck of the main flue, to control the chimney draught. This, of course, gave us relief; but, at the same time, it occurred to me that, after opening the damper on the cessation of the gale, the same thing would repeat itself, and the mischief be done before thought was given to the closing of the chimney-damper. I therefore set to work, in conjunction with my Works Superintendent, to erect a governor to operate the damper automatically.

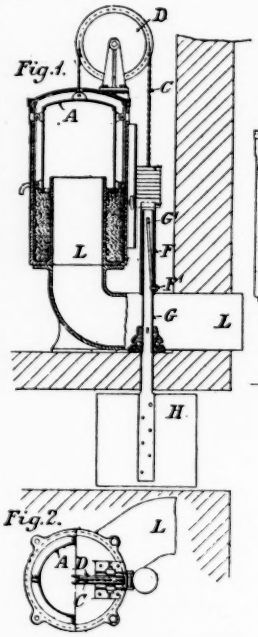
Since commencing my paper, I have come across the following observations made by Mr. Marshall, of Copenhagen, at a meeting of the Institution of Gas Engineers, held on May 2, 1899, in a discussion on Mr. Lewis's paper on "Modern Systems of Retort Heating," which I think show the importance of the subject.

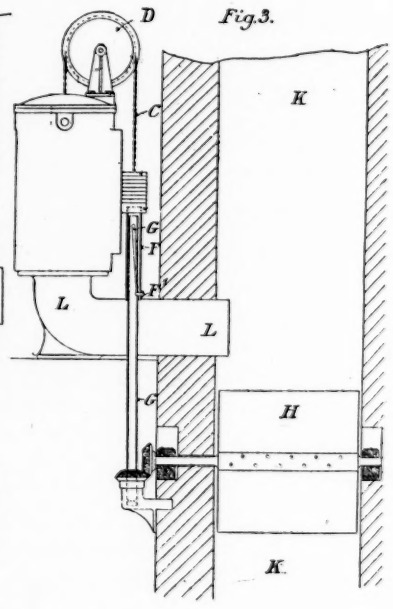
> The amount of air drawn up the main shaft varied every hour of the day—it was never constant; and the result was to alter the equilibrium of the furnace. Therefore, to arrive at perfection, there must be an automatic regulator inside the flues, to be balanced by the force of the wind. This was the theoretical idea.

The practical idea was the work taken in hand by myself; and with the apparatus shown here in model form, you will see that, in the event of any material change in the draught of the chimney, the governor operates on the damper—partially closing it, and thus preventing any excessive draught on the settings.

The action of the governor is as follows: When, owing to any change in the wind pressure or other cause, the draught is increased, a reduction of air pressure or partial vacuum is created in the passage leading from the chimney or flue to the governor, which draws down the governor—thereby imparting motion to the damper, which it closes sufficiently to effect a corresponding decrease of flue area until the normal velocity of the passing gases is restored. The reverse action of the governor then takes place, and the damper area opened to correspond, and so automatic action is obtained, and a direct control of draught velocity maintained.

It will be seen in fig. 1 that an increased draught in the chimney K causes a reduction of air pressure or partial vacuum in the passage L, which allows the bell A to fall, pulling the chain C





over the pulley D, and raising the tube F. The set-screw F^1, engaging with the helical or spiral groove on the slot G^1, causes the tube G to rotate, and also the damper H, which it carries.

Although this was a first idea, I have found it to be so effective that the strongest gale has had no deleterious effect on the heats of the settings; and I am of opinion that, by further experiments, the theoretical ideal of Mr. Marshall can be reached in a practical form. I am afraid that the subject of chimney draught and its systematic regulation is one very much neglected. If it is admitted that it is such an important factor in regenerating firing, then it deserves closer attention at our hands.

Just as it is necessary to have gauges in connection with every piece of apparatus from the hydraulic main to the holder, it is equally necessary to have a gauge in connection with the main flue, to show at a glance the force of the draught, so that any marked variation may be noticed at once. It might be argued that at most of the larger works there are night and day attendants, who would notice any effect from the cause I mention; but there are a great many gas-works where this is not practicable. Besides this, all men are likely to err, and the evil is done before thought is given to the cause. Having provided an intelligent workman with a ready means of ascertaining any change, easy facilities for checking the draught should be placed within his power.

No regenerative settings can be worked satisfactorily without one controlling damper; and as it plays such an important part, it should be so fixed as to be easy of manipulation. But how many are so unwieldy that it takes several men to move them; whereas, with a little consideration, a damper could be so fixed as to be opened or closed with the least possible exertion. For instance, one could be placed in the chimney, turning on bearings

in wall-boxes, with one end of the shaft projecting, attached to which would be a means of working with a chain. Again, a damper might be fixed vertically in a flue, and arranged in such a way that the damper was counterbalanced, so that the placing of a weight would open or shut the damper. Care should also be taken that the frame in which the damper has to work is large enough to allow for expansion; otherwise in due time, owing to this cause, the damper will fit tight, and be almost unmoveable. Or, lastly, a damper might be provided which would be actuated by the wind itself, in a manner similar to that I have in a very humble way endeavoured to bring to your notice, and thus establish in practice the theory of controlling the chimney draught by the wind itself, with the resultant benefits of a constant draught on the furnaces, regular temperature of escaping gases into the chimney (thus preventing variation of draught from this cause), and reducing to a minimum the attention bestowed on the regulation of the air supplies (as when once the secondary and primary air supplies have been adjusted, with a constant draught, regular working will ensue).

[At the close of the reading of the paper, Mr. Hudson exhibited a splendid working model of his device, which he further described to the interested members.]

Mr. Isaac Carr (Widnes) asked how much less in practice was the area of the damper than the area of the flue.

Mr. Hudson answered that he made it to close not more than half the flue.

The President said they were much indebted to Mr. Hudson for bringing the model and the paper before the members; and he hoped there would be a good discussion.

Mr. H. Townsend (Wakefield) said, as he was privileged to introduce Mr. Hudson to the Institution, he felt gratified that he had come forward in this manner and given the members this excellent paper, and more particularly as Mr. Hudson had found a difficulty at his works—a special difficulty, perhaps—and had set to work and evolved this mechanical cure for it. Knowing that Mr. Hudson was going to bring this paper forward, he (Mr. Townsend) had taken some little pains to see how the apparatus would answer in his own works; and the conclusion he had come to was that, in his own case, such an apparatus was not really necessary. He did not know in what respect the circumstances differed so much between his works and Mr. Hudson's. But he had taken particulars of the vacuum in his chimney at Wakefield through the whole of the winter; and he had never so far found a variation in that vacuum of more than $\frac{1}{10}$ inch. That was to say, when the heaviest gales were blowing, they had a vacuum of $\frac{7}{10}$ inch; and during the calmest of weather they had a vacuum of $\frac{6}{10}$ inch. That period covered two or three very strong gales. On Dec. 9 there was a heavy gale, which demolished a large chimney-stack at Morley. The vacuum that day was $\frac{7}{10}$ inch, and the heats were normal. On Jan. 6, there was another heavy gale; and the vacuum was $\frac{7}{10}$ inch, and the heats normal. So his experience was different from Mr. Hudson's. Now last year when he (Mr. Townsend) put his inclined retort-benches to work, the same chimney gave $\frac{8}{10}$ inch vacuum; and the reason he thought was that when they started the inclines, it was some time before they found the exact proportion of primary air to secondary air, and a certain amount of the gases got into the main flue and so into the chimney. He found that the heat in the main flue and the chimney increased the draught more than a gale of wind itself. On looking at the table given by Mr. Hudson, he saw that this view was borne out. For instance, taking a chimney 40 feet high, with a temperature of 250° Fahr., he saw there was a suction of ·14; while with a temperature in the same chimney of 500°, the vacuum was ·25 inch. So the increase of temperature by 250° nearly doubled the vacuum in the chimney. There might therefore have been other causes at work rather than the wind. If a certain amount of gas was allowed to escape into the chimney, it would increase the vacuum more than a gale of wind. He had taken particulars of the barometric pressure and temperature; and during the time that he had taken these observations, when the vacuum in the chimney only varied $\frac{1}{10}$ inch—from $\frac{6}{10}$ to $\frac{7}{10}$ inch vacuum—the barometric pressure varied from 29·05 to 30·45; and the temperature varied from 17° to 59° Fahr. Of course, they had all experienced the effect of wind blowing on their retort-settings, and, by increasing the radiation, it had lowered the heat of the benches; and this was apt to be somewhat confused with the effect of the increase of vacuum on the chimney. The conclusion he came to was that, while he admired very greatly Mr. Hudson's ingenuity in devising this beautiful piece of apparatus to overcome the difficulty he had felt in his own works, yet it was not of general utility. At the same time, it did not diminish a bit the obligation which they were under to Mr. Hudson for having prepared the paper and model.

Mr. Isaac Carr said he should like to say that, in his opinion, this little paper was one of the most able and interesting that they had had brought before the Institution for a considerable time past. They were all aware of the difficulty of maintaining a regular, constant heat in the retorts; and anything that would tend to help to better results in this direction, or more uniform control, was a very important step indeed. Looking at the paper, and listening to the remarks of Mr. Townsend, it occurred to him that the altitude of the chimney might be an important factor in this matter. Mr. Townsend told them he had taken observations from his own chimney, and found the degree of variation was so slight that, in his opinion, such an apparatus was unnecessary in his case. It occurred to him (Mr. Carr) that this might arise from the altitude of the chimney, which appeared to him to be an important factor, because with a high chimney unquestionably the variation was very much greater than with one of lower altitude. Probably in his reply the author would give them what information he could on this point.

Mr. R. Hooton (Ashton-under-Lyne) said the members were much indebted to Mr. Hudson for his paper on chimney draughts, because there was no doubt that the efficient control of the draughts on the settings was the secret of good, uniform heats and good make per ton, at a minimum cost for fuel in generating the heat requisite for carbonization. He had himself been working both horizontal and inclined settings; and his experience was that to get good results it was very necessary—especially with inclines—to watch carefully this question of the draughts on the settings. Mr. Hudson had shown them a splendid model of his apparatus; but he (Mr. Hooton) was doubtful as to whether it was going to be practicable. However, if they could get something which would automatically keep a steady vacuum on the chimney, it would be a specially good thing. He thought the results he had found at Ashton would be of interest to some of the members. Taking the inclines first, he found that on the charging-floor he got from $\frac{1}{10}$ inch to $\frac{1\frac{1}{2}}{10}$ inch pressure; on the drawing-floor $\frac{1}{10}$ inch pressure; and over the damper $\frac{2}{10}$ inch vacuum. His chimney on the inclines gave $\frac{6}{10}$ inch vacuum, and on the horizontal generators he always tried to get a light vacuum—the chimney giving $\frac{4}{10}$ inch. He might say that he was an advocate for a liberal use of damper, particularly with inclined settings. In his next installation he intended to apply a plan he had himself devised for trying to get over the difficulty sometimes experienced in the heating of the lower part of the inclined retorts. It was a plan of producer which would make inclined settings equally as easy to manage in regard to distributing the gases as any horizontal settings. There was no doubt that Mr. Hudson had done well in his own case. The apparatus brought before them was simply a model; and, for his own part, he should like to see it working on a practical scale. Still Mr. Hudson was to be heartily congratulated on both the paper and the apparatus.

Mr. Charles Wood (Bradford) said he had listened with a considerable amount of interest to the paper; and he should like to compliment Mr. Hudson upon the apparatus he had invented and applied at his works. He thought there was a certain field for the apparatus; but he fancied there was one point the author had overlooked. In the first part of his paper, he said the draught of a chimney was regulated by the temperature of the waste gases and its altitude. The draught in a chimney, he (Mr. Wood) thought, was determined by, first of all, the difference between the weight of the gases in the chimney and the weight of the corresponding column of air, and the quantities of the gases which were travelling up the chimney at the time. Some years ago, they had a good deal of trouble. They had some ornamental chimneys, nearly 200 feet high, which were very substantially built, and cost upwards of £1000 apiece. They had a considerable amount of trouble with them. They were too large for the work, and there was a good deal of difficulty in controlling the draught of the settings as the number of retort-settings was varied from time to time. These works only being one of four, they were in the habit of putting on perhaps double the number of retort-settings working on the chimney at once. The result was naturally that the temperatures of the settings (they were only ordinary settings, by the way) were altogether upset—so much so, that they gave up using these chimneys altogether; and they were still only ornaments of the gas-works. They found that, by discontinuing them, they could save something like 1 cwt. of coke per ton of coal carbonized; and they were now using practically short chimneys inside the retort-houses, instead of long ones. Where there was a high chimney, with sufficient draught and large enough for its work, the apparatus brought before them by Mr. Hudson might be a very satisfactory means of getting a steady draught upon the settings, although he thought the tendency of modern installations was to have a number of small chimneys each dealing with a comparatively small number of settings.

Mr. W. Prince (Stoke-on-Trent) said to his mind Mr. Hudson seemed to give to his apparatus a greater amount of credit than he would find in the future he could really lay claim to. All of them who had regenerator firing to deal with, knew there were a hundred-and-one causes which affected these things very considerably. He found that it depended on cellar floors or stage floors altogether how the settings worked. He personally thought that, with a much simpler piece of apparatus to enable them to make their observations, they could effect all that Mr. Hudson claimed for his mechanism, which undoubtedly was very ingenious. He (Mr. Prince) had an observation taken every week—sometimes two or three times a week—with a "Perfect" vacuum recorder. It only meant fixing it in a plug-hole of the setting in any part; and they could tell whether the settings were working rightly or wrongly. He believed that all regenerative settings were fitted with an inspection plug. He could not see how a piece of sensitive mechanism could be expected to work in a retort-house, where the conditions were altogether opposed to a fineness of mechanical principles being adopted. It would require a lot of hammering into his head before he would be able to see that the apparatus would be of practical utility to the profession.

The PRESIDENT, in closing the discussion, said in his case he had a long chimney and a short one. In the long one, he had a main damper, which was altered each time he put a setting on or let one down. He had no difficulty with it whatever.

Mr. HUDSON, in reply, said whether his paper was profitable or not to the members, he had enjoyed giving it, had enjoyed getting out the model, and had enjoyed the benefits that the original had given him in the working at Normanton. Mr. Townsend had made various tests; and he told them that his vacuum never varied above $\frac{1}{10}$. In that case, the apparatus would not be of any advantage to him. Mr. Carr had spoken of the difference in altitude affecting the chimney draught, and had suggested that it might account for the difference in the working between Mr. Townsend and himself. In the table for the chimney that was 40 feet high, with the escaping gases at 500° Fahr., the vacuum was ·2556; whereas a chimney double the height, it would be seen, would just double the vacuum. Therefore the higher the chimney the greater the vacuum, and evidently in direct proportion. Further, whether or not a high chimney was affected more by gales than a low one (as wind went in waves) he was not prepared just at the moment to say. By being shorter, perhaps his chimney felt the effect of gales more than Mr. Townsend's, which was 150 feet high. Mr. Hooton told them that his chimney on horizontals gave $\frac{4}{10}$ inch vacuum, and on inclines $\frac{6}{10}$ inch. He (Mr. Hudson) did not see how a chimney was going to be affected in its vacuum by the work it had to do. A chimney would give a certain normal vacuum, irrespective of whether it was working inclines or horizontals; but evidently, when working inclines, a lot of Mr. Hooton's heat was going up the chimney—causing greater velocity of the air, and giving him more vacuum. If he arrested that, it would certainly be to his advantage. Mr. Wood told them that the draught was affected more by the weight of the column of air against the escaping gases. This was so; and he (Mr. Hudson) thought it was generally admitted. He stated in the paper that the draught of the chimney was regulated by the temperatures of the gases entering the chimney; also by the air at the top, and by its altitude. The temperatures of the waste gases if they were high would give a greater vacuum. If Mr. Hooton told them he was getting $\frac{6}{10}$ inch with his inclines as against $\frac{4}{10}$ inch with horizontals, then there was a greater amount of hot air displacing the cold air, and giving an increased vacuum in his chimney. Mr. Prince said there were a hundred-and-one causes which might affect regenerative firing. He (Mr. Hudson) had had this apparatus at work for some time, and he had had to renew it once for this reason: He had it under a liquor tank which had been leaking, and it got corroded. But at the present time, it went so well that his primary and secondary air arrangements had not been touched for at least a month past. It, therefore, dispensed with a time visitation to see whether it was right. The time visitation which told them whether or not they had a right vacuum, did not keep the vacuum right. Between the time visitations they might be wasting work that the retorts might be doing. During the equinoctial gales (which caused him to take this matter up) he went into his cellar and took out the plug, and there was at once quite a whistle. This made it apparent to him that there was a great excessive draught; and, without going into the hundred-and-one causes, that was the cause which made his heats go down. Other causes had not shown themselves to be so serious as to affect the heats. Well, this was now controlled by an apparatus something like the model; and he felt the benefit of it by not having to give such close attention, or daily visitation, to it as would be otherwise required. He thanked the members heartily for the kind way in which they had listened to him.

Mr. W. WHATMOUGH (Heywood) read the following paper on

THE DISPOSAL OF COKE.

For some time past, the question of the disposal of coke has exercised the minds of gas engineers; and as it has been suggested that a discussion of the question by the members of the Institution would be of interest, I venture to submit the matter for your consideration. There is no doubt that gas authorities during the last twelve months have suffered severely in revenue from the large decrease in the prices obtained for coke, and that the percentage of decrease has been considerably in excess of the advantage gained by the reduction in the price of coal.

The various causes which have been in operation to keep up the price of coal are known; and although bad trade may have told against the sales of coke, yet there are certain matters in connection with the trade, which, by a better understanding with each other, and mutual co-operation, producers of coke might protect themselves from the cutting prices which are brought about through the accumulation of stocks and surplus supplies. I do think, however, that the best remedy lies in nursing the consumers, and using every means for the furtherance of local sales, instead of selling all the surplus stock at ridiculously low prices; for it is far better to give the advantage to our own consumers than that the profit should go into the hands of the trader, who, in many cases, often enters into competition with the producer, not only in his own district, but in other towns also, so that the whole of the coke trade is practically injured.

It was in the winter of 1895, with an increasing business, and the adoption of gaseous firing in the retort-house, that the stock of coke at the Heywood works had largely accumulated; and although our yard price was only 5s. per ton, we could not dispose of the coke locally. The best price obtainable for the surplus stock, f.o.r. Heywood, was 4s. 9d. per ton, which was equal to 3s. 6d. per ton at the works. As the price offered was exceptionally low, it was decided to strike out a new line by preparing the coke, and breaking it to one uniform size, and delivering it to the customers. With this object in view, the Corporation put down a small apparatus as an experiment—the expenditure being limited to £20; so that if the trial should prove a failure, the loss would certainly not be very great. In the first instance, what was termed a hand-breaking machine was obtained; but upon application, the term was found to be a misnomer, as it was impossible for one man to work it, and very difficult for two. A second-hand steam-engine was therefore brought into requisition, and by January, 1896, the apparatus was set to work. In order to bring the matter before the public, the town was advertised freely; and the following is a copy of the circular distributed throughout the district of supply:—

BOROUGH OF HEYWOOD.

(GAS DEPARTMENT.)

IMPORTANT TO HOUSEHOLDERS, &c.

The Gas Committee are now prepared to supply clean coke, broken to one uniform size, suitable for householders, smiths, gardeners, &c. Coke of this quality is screened free from dust, and is much better and more economical for many purposes than unbroken coke. When mixed with coal, it is invaluable for the ordinary purposes of heating, and renders the fire brighter, cleaner, and better than can be made by any other means.

Delivered free of cost until further notice within the district of supply at 4d. per bag. Price at the gas-works, 7s. 6d. per ton.

Orders given to the Inspectors, or left at the Municipal Buildings, the Gas-Works, or forwarded by post, will be promptly attended to.

W. WHATMOUGH,
Gas-Works, Heywood, Dec. 19, 1895. Manager.

The response to the circular was encouraging, and a horse and lorry were hired, by the day, for the purpose of delivering the coke in bags ordered by the customers; the remainder of the time being devoted to pushing sales. But I think it may be taken as an axiom that business of this kind can be worked better by commission than by day work; and as our carrier was not prepared to work on commission, the net result of the bagging trade was not so satisfactory as it might have been—the average price per ton, after deducting all expenses, amounting to 5s. 9d., as against the yard price of 7s. 6d. This price, of course, was better than selling to outsiders; and as we sold 274 tons of broken coke from January, 1896, to the close of our financial year—March, 1896—we had reason to believe that, although the first venture was not very profitable, we were laying the foundation of a trade in which there was a prospective increased value, and this subsequently proved to be the case.

In the autumn of 1896, the Corporation gave up the bagging business, and arrangements were made with one of our local tradesmen to do the work and purchase the coke (both ordinary and broken) at the yard price. From that time until now, the bagging trade has been in the hands of local dealers, who buy practically 1500 tons per annum, or 30 per cent. of our total output. After the first year, contracts were entered into with any local dealer, for quantities of not less than 100 tons, for twelve months at the prevailing yard prices. I know the wisdom of adopting this system will be questioned, and that it will be contended, as a principle, that gas authorities should undertake the supplying of customers themselves in order to give satisfaction. But we have no complaints; and I think the system adopted depends upon local conditions. We, as a Corporation, are bound to sell for cash; but the dealers sell for credit, and collect the money weekly from the customers on the Friday and Saturday evenings. This arrangement is very convenient for a working-class population, and makes a great difference in the sales of coke in small quantities. Should dissatisfaction arise, however, the Corporation always have the power, and would be justified in adopting a system more advantageous to their interests.

The following twelve months, ending March 31, 1897, showed a further advance in the sales of broken coke; the total quantity being 581 tons. So that as the trade had evidently come to stay, the advisability of erecting a permanent and more economical plant was brought under consideration, for the small apparatus had proved not only insufficient to meet the demand, but had been rather costly working, as the breeze was practically 20 per cent. of the whole. Moreover, during the breaking operations, two men were required—one for filling the hopper and the other for taking the broken coke away and keeping the breeze free from the machine.

Tenders were accordingly invited for coke breaking and screening plant, and for storage plant also, to facilitate loading. The Gas Committee accepted the tender sent in by Messrs. Barry, Henry, and Co., of Aberdeen; and the plans which are placed before you represent the plant now in operation at our works. The whole of the plant is placed in a convenient corner near the entrance to the retort-house, so that the coke may be wheeled on the floor level of the retort-house into the fixed hopper which receives the coke from the retorts. Inside this hopper, and attached to the gearing of the breaker, is an arrangement of forks which brings down the coke gradually into the breaker, and saves the cost of labour in pushing it down. Before its adoption, it was

necessary to employ a man to do this work; but the machine is now automatic, and runs satisfactorily.

The breaker is capable of breaking 10 tons of coke per hour. It is made of hardened cast-steel prongs fitted on two cast-iron rollers, with one of the rollers adjustable, so that the coke may be broken into different sizes, as may be required; or the coke may be passed through almost without breaking. There is also an adjustable slide to prevent the coke from falling on to the breaker before starting the apparatus; otherwise there would be difficulty, because of the jamming of the coke between the rollers.

The elevator is of the steel lattice-girder type, having buckets 16 inches wide, steel chains, boot fitted with tightening gear, and top gear with countershaft. The revolving screen has plates of different sizes for dividing the coke into large size, 1-inch smithy coke, and ½-inch coke and breeze; and it is driven by a detachable chain from the top to the countershaft. A steel shoot is fitted between the elevator and screen, and also one between the screen and storage-hopper, to convey the different sizes of coke to their respective storage divisions. The storage-hopper is built of ¼-inch plates, 7 feet square, with a sliding door at the bottom for loading carts, and a detachable shoot, with an arrangement for filling bags. The hopper has a capacity of 9 tons. This gives very little room for storage; but the plant is so arranged that a conveyor may be fixed, and the hoppers extended when desired.

The whole of the plant is worked by a 6-horse power (nominal) steam-engine, which is erected underneath the platform leading from the retort-house to the hopper over the breaker. This platform, which is slightly inclined, is made of wood, so that the men may have a good footing; and in order to make the engine-house underneath, waterproof, the covering is lined with specially prepared felting, which answers admirably.

The cost of the plant, not including foundations, was as follows:—

Engine	£71
Breaker, &c.	35
Elevator, &c.	108
Storage hopper, columns, &c.	145
House over screen and elevator	10
Total	£369

The plant was brought into use on March 31, 1898; and, of course, like most new plants, there were several matters to adjust. The screen was not satisfactory, as the smallest mesh, in the first instance, was only ¼ inch, and allowed too much of the breeze to go over with the 1-inch smithy coke. But by increasing the size to ½ inch, and altering the inclination of the screen and fixing additional screens to catch the coke as it fell into the respective divisions, satisfactory results were obtained. The following is an average analysis of the respective sizes of coke after passing through the apparatus:—

	Per Cent.
Large size for household purposes	83
1-inch smithy coke	10
½-inch coke	2
Breeze	5
Total	100

The breeze, of course, is not wasted, as it is used up at the boilers for generating steam for the works.

We were now thoroughly equipped; and as the apparatus could be started and controlled by the foreman, a considerable saving was effected, and the screened coke, which before had been carted to the boilers, was now an article for sale which brought in good prices. With the old apparatus, 1s. 8d. per ton extra was charged for broken coke; but under the new arrangement the price was reduced to 10d. The facilities for loading carts and bags were appreciated, and saved much time and expense; so that our sales continued to increase. The following statement shows the sales of broken coke for the respective years, ending March 31:—

	Tons.
1897	581
1898	320
1899	854
1900	916

The decrease for 1898 is due to the erection of the new plant in the winter of 1897, when no broken coke was sold. The sales for 1901 are not given in the above statement, as the price of coke for that year was abnormal—due, of course, to the inflated prices of coal. The customers would not pay the high price for broken coke, and in consequence only 360 tons were sold.

In considering this question from a commercial point of view, the only way of proving the utility of its adoption is by taking the receipts for both broken and ordinary coke together. The following statement shows the amount realized per ton for the sale of coke for the respective years, and the price paid per ton of coal for the same period (as per balance-sheet), less the quantities transferred for generating steam at the boilers:—

	Average Price Realized for Coke.	Average Price Paid for Coal.	Percentage of Coke to Cost of Coal.
1897	5s. 2·91d.	10s. 4·44d.	50·55
1898	5 9·41	10 5·52	55·29
1899	6 10·02	10 5·24	65·49
1900	8 7·22	11 3·62	76·11
1901	11 4·11	14 4·55	78·88

From this statement, it will be observed that, for the period under consideration, the increase realized for coke in proportion to the cost of coal is 28·33 per cent. I ought to state, however, that the cost of coal for 1901 was favourable, as a considerable quantity of the coal included for that year was purchased at old prices; so that the relative value for coke would not have been so good under ordinary conditions. But taking the year 1900, there is still a gain of 25·56 per cent., although our increased sales amounted to 1020 tons. The wear and tear has been satisfactory; the replacements averaging only about £3 per year since the plant was erected in 1898.

From the foregoing statements, I venture to suggest that, in small and medium-sized works, except in special circumstances, there is no difficulty in disposing to advantage of practically the whole of the coke produced for sale, and that the remedy lies within the power of the producer. In a measure, the same principle will apply to large works also; but there must be a surplus stock to dispose of, and it is desirable that a more uniform standard should be agreed upon by producers. A hard-and-fast line, however, as to selling prices, would not be practicable. Still, much more might be done by systematic communication with each other; so that large quantities of coke might not be placed upon the market at ruinous prices. It is not for us to combine and give the coke a fictitious value; but as there is no article of trade sold at such varying rates, it is important that some scheme should be devised in order to protect ourselves. It is well known that Mr. Meunier, of Stockport, has done much to bring sellers of coke in his district more in harmony with each other; and the gas profession is greatly indebted to him for his efforts in this direction.

The question is a delicate one, and surrounded with difficulties; but the more the retail trade is controlled by the producer, and direct communication maintained with the consumer, the better will be the result, not only locally, but also to producers generally.

Discussion.

The PRESIDENT, in opening the discussion, stated that he had a coke-breaking machine. He prepared his coke in three sizes for disposal; and in the last six months, they had started hawking it at 4d. per bag or 8d. per cwt. From his experience, it paid very well indeed.

Mr. H. TOWNSEND (Wakefield) said he was much disappointed when he read his paper at Wakefield that the discussion did not turn on this coke question. He introduced it purposely to draw discussion. The question of coke was an important matter to all of them, owing to the arsenic scare and the export duty on coke. These things had caused a slump in the coke market, and he felt quite convinced in his own mind that, if only they tackled this subject as the author of the paper had done, they could dispose of all, or nearly all, of the coke in their own districts. If only they took this matter in hand, and achieved that result, it would be beneficial to themselves and everybody else. For his own part, he was doing the best he could in that direction. He had, as he explained at Wakefield, no necessity to break his coke; it was already done for him. But he had got plans out now for a very similar system to the one Mr. Whatmough put before them; and he hoped to get somewhat similar results. He sincerely hoped all the members would look into this matter, and try to prepare their coke so that it was suitable for domestic consumption. If they could send it out suitable for domestic fireplaces—small enough, clean enough, and in small enough quantities—they could work up a large domestic connection which would be beneficial all round.

Mr. S. G. PERRETT (Market Drayton) said he was troubled about what they were going to do with the coke at his works. They had, a short distance away, two or three chemical works, which poured coke into his district. He was simply inundated with coke. There were no large places in his district in which he could get rid of it; and he thought the only way was to break it up and sell it as the author suggested. This was certainly what he would have to do.

The PRESIDENT remarked that he saw in a paper something about the Midland people having a combination for the purpose of selling their coke. It was pretty evident the last speaker did not belong to that combination.

Mr. J. H. BREARLEY (Longwood) said this paper had come at an opportune time, when it was absolutely necessary they should do something with their coke. There had been a lot of cutting competition; and every member had been subjected to it in a greater or less degree. In his own case, he had lost one of his largest consumers. They had a combination in the district. But they had not taken into account works 10 or 12 miles away; and they had been subjected to competition from farther afield than the combination extended. He had lost the large consumer referred to through works 12 miles away. He found they were sending the coke to this consumer at the same price as they were selling it at 12 miles away, which showed they were selling their surplus to the disadvantage of the Longwood works, and selling it at a cheaper rate than they were doing in their own locality. The only thing he could do was to retaliate; and so he had been sending an equal quantity into the district of these competitors. He could not do with this surplus coke in his yard after he had lost the customer; and he would not send it into the district of any company who had not competed with him. He laid the matter before the engineer of the works in question; and this was the only thing he (Mr. Brearley) could do. They declined to hand over the contract to his company; and so all they could do was to send their surplus coke into the district of their competitors. During the last few weeks, he had been thinking over the matter

brought forward in the paper; and he had practically decided to try to cultivate a local sale. He thought Mr. Whatmough had adopted the best plan in letting the local dealers have the coke. They had, in his own district, a lot of these coke sellers, and he considered it preferable to let them have the retailing of the coke at 4d. and 6d. The gas companies would have much difficulty in giving the week's credit of 4d., 6d., and so on.

Mr. T. Duxbury (Oldham) said he had had the pleasure of seeing the author's plant at work on many occasions; and he must admit it was an easy method of breaking, cleaning, and bagging the coke. It was a little plan well worthy of adoption by them all. He had been fairly in touch with the sale that had taken place in Heywood; and there was no doubt about it that what Mr. Whatmough had adopted, each of them ought, if possible, to adopt. One great drawback that he had always found to selling coke locally was that builders, in erecting houses, made provision for (say) a ton of coal, but they made no provision at all for coke. There was no room for a load of coke; but if they could take it round in bags of ½ cwt. or 1 cwt., broken up to a size to suit the consumers, they would find their local trade in coke grow. The greatest and most important point to his mind was the necessity for some understanding between the managers of various towns. This was a matter that had been discussed in Manchester now for many weeks; and Mr. Meunier had something to say upon it at that meeting. If the scheme was only carried forward, he (Mr. Duxbury) felt sure it would be one of the best things that had been introduced in connection with coke or any other bye-product of gas-works.

Mr. W. W. Hutchinson (Barnsley) said Mr. Whatmough had brought before the Institution a most valuable paper and one that was very *a propos* to the present situation; and it only wanted developing and applying, to not only answer, but to do away with any combination among gas companies in connection with the sale of coke, and likewise to get over the difficulty that had been mentioned by two or three of the speakers. He held, and held most strongly, that if all gas-works would put themselves in a position to break coke and deliver it in convenient quantities to the houses of consumers in their respective districts, there would be no surplus coke at all. To give point to what he had said, he might mention that for over 20 years they had practised this in the town from which he had come, with great advantage from the point of view of price. Previous to the period he had named, they, like others, used to sell job lots in boat loads, and get rid of it at ridiculously low prices. What was the effect now? They could regularly sell it at a high price in a coal district—at a higher price than coal was sold at. And this could be done in all other places at corresponding prices. It was essential that the coke should be distinctly good, and that it should be delivered. They delivered the coke by cart in small quantities at a certain rate per cwt., and delivered it wherever it was wanted; so that this got over the difficulty of having the coke in an unsuitable place, and all that sort of thing. There was a good deal to be done in this matter by, and with advantage to, gas-works. When the arsenic scare came on, he had only two contracts with maltsters. They gave up their contracts in a great hurry; but this did not bother him at all, because he soon found a market for the coke in another way. But they would not have been able to do this if they had not regularly carried on this small class of business. The quantity of coke they disposed of for household purposes was about 35 per cent. of the total quantity they produced; and this percentage was capable of being enlarged. He thought that the writer of the paper had hardly claimed sufficient credit for the method of selling coke in this way. He considered Mr. Whatmough ought to have claimed that it improved the atmosphere of the neighbourhood in which it was practised. A large difference in this respect could be made by the use of coke in place of coal. Then Mr. Whatmough did not take sufficient credit for the extra price he got for the coke that he did not sell for household purposes. The selling of the broken coke for household and other purposes hardened the price of the other; and he thought the author ought to have taken credit for it in the paper.

Mr. Isaac Carr (Widnes) said those of the members who had the opportunity of visiting the Clichy works of the Paris Gas Company last year saw what was possible in the way of manufacturing a special coke. There practically the whole of an enormous production was handled and re-handled and prepared for special purposes. He believed the Company that had done most in this direction in England was that at Sheffield; and it would be interesting to know from Mr. Morrison what proportion of coke they had been able to dispose of for domestic purposes. Of course, the bulk of the Company's production went for manufacturing purposes. But there, like Mr. Hutchinson, they were surrounded by coal mines; and no doubt they had great difficulty in combating the coal market.

Mr. J. W. Morrison (Sheffield) remarked that he was very pleased indeed to see this paper brought forward; because he felt, with others, that the suggestion it contained was a step in the right direction. In Sheffield, they had laid themselves out largely for disposing of the coke, more especially since the arsenic scare. As the members were aware, the Sheffield Company produced an enormous bulk of coke; but they were differently situated to many of the members. Owing to their being the steel centre, there was a considerable quantity of coke used for manufactories. But they also laid themselves out to largely deal with small quantities. They did not do anything much under half-a-ton; but they gave every facility to manufacturers to have any size they wanted—from large pea up to what they called their apple size. They also met householders very readily; and it was undoubtedly a trade they ought to cultivate. They were finding great benefit from this at the present time. They had fitted themselves out largely with machinery for dealing with the coke, and they had amply repaid themselves for it. It had created for them a good market. They not only dealt with the coke dry; but for special purposes, where bats and pyrites must be kept out, they washed the coke by hand. When he was in Birmingham, many years ago they put down power plant for washing, but they found it was not economical.

Suggested Extension of the Institution's Work.

Mr. S. Meunier (Stockport) said this coke question was one that had, as the members were aware, very largely interested him. The custom in the North appeared to be somewhat different from what it had been in the Midlands and the South. Coke had gone, and had been allowed to go, without any particular endeavour to sell it locally. If the works were small enough to dispose of their entire output, so much to the good; if they were not, then they dropped the price to such a figure as would make it go. He had not been in the district long before he found that the disposal of coke on these lines was much a matter of weather. If the weather was cold, the coke would go very extensively; if the weather was warm, the coke had to be stacked, even though the price was dropped. The only effect of reducing the price was to bring consumers from neighbouring towns and districts to fetch away the coke which the gas manager had anticipated would be carried away by his own consumers. Then they started the bagging trade for coke in Stockport. He (Mr. Meunier) having, like Mr. Morrison, come from a town where a great deal of coke was sold in bags, he naturally looked to that system for a remedy. Having no horses, they had to hire one, with the consequence that he came to the same conclusion as Mr. Whatmough did, that they lost money. Ultimately they altered this condition of affairs, and instead of handing the business over to anyone else, they went on with it themselves. They had as a result sold a good deal more coke for household purposes, and had gradually created a knowledge of the benefit to be derived from the burning of coke in connection with coal. They had been extremely busy this last winter, so much so that all the coke that was imported into the town had not affected the price. The price was still good; and he hoped it would continue so. Strange to say, when he first went to Stockport, they used a great proportion of cannel; and, at a difference of 10d. per ton, cannel coke would go in preference to coal coke. Now with a difference between 6s. 8d. and 12s. 6d. per ton, the best coke went, and the cannel coke stopped. Undoubtedly the next step to take was what Mr. Whatmough had done—to break the coke for consumers. They were now and again asked, "Cannot you let us have smaller coke?" The reply was, "Unfortunately, we cannot at present; but we hope to do so in the future." These were the difficulties they had met with; and this question of competition—of blind competition he should like to call it—between town and town, practically altering prices to their own suiting, irrespective of what their neighbour was doing, led him to the conclusion that benefit would accrue if the engineers could only obtain the necessary information periodically as to stocks and prices in the district. This idea was started by about twelve or fourteen towns close by; and they found the benefit was very great indeed—as a guide, not in the way of fixing definite prices, but for making alterations. They ultimately enlarged the number of subscribers to 35, and that was the number now on the list. This affected local prices only. But it was discovered that coke was being sold under contract prices, or sold in bulk to dealers who dealt with it how they liked, so that it acted against the local gas-works. This being so, and as the profits, such as they might be, were being put into the wrong hands, a meeting was held a little while since to discuss whether some steps could not be taken in order to enable them to know from time to time what each gas-works was doing, what position each was placed in, and what price they were able to obtain, with the view of finding each other's opinions, and not, as he said before, to fix any definite price. Two meetings had been held, and the outcome of the conference had been to show that not only could this idea be worked very beneficially to them all over the coke trade, but it also opened out a very much broader sphere of utility. At the last meeting, 35 of the towns in the immediate neighbourhood of Manchester agreed to form a Committee—a temporary Committee—pending this meeting of the Institution. The intention was that a meeting should be held at least once a month to discuss not only the coke market, but any other market, or any other commercial question which one might have to deal with at the moment. In this way, a manager could seek the advice of his brethren, see how they were situated, and go back home with full and reliable information to lay before his Board or Committee, and suggest to them what would be, under their particular circumstances, the best steps to take. This he (Mr. Meunier) thought was a very laudable thing for them to strive for; and in order to give it the weight and influence it ought to have, they came to the conclusion at the meeting that, if possible, it should form a portion of the duties of the Institution. He (Mr. Meunier) wanted to suggest that it would be extremely advisable, and a very useful thing, for all the members, if the Institution (which he recognized was, in the original instance, absolutely an engineering society) would take up the commercial aspect also, and help the members on that side of their general duties as

well as on their engineering side. The idea he had in his mind at the moment was that the Committee of the Institution should consider first the question of whether they had the power to undertake this new duty; secondly, if not, to suggest such rules or alterations as would bring it into the scope; and, thirdly, to try and arrange that the widely scattered area which the Institution covered should be divided into sections, so that meetings could be held in each, at such periodical intervals as might be thought fit, and at which meetings reports from each division could be presented. If they could manage to bring this into the scope of the Institution, it would, he ventured to think, be a step in the right direction, and one which would be undoubtedly of mutual benefit all round, and would help to do what they had all been striving to do for so many years, in the face of numerous difficulties—to reduce the price of their commodity, and still pay the dividends, or hand over the profits, which they had been able to do in the past. In his opinion, it was absolutely necessary that something should be done, more especially in view of the competition which they had now to face. They had all sorts of schemes being propounded at the moment for producing cheap fuel gas. There was the Mond gas, Dowson gas, and all these things, which would undoubtedly affect their undertakings unless they were in a position to reduce the cost of gas. If they could by any means bring down the selling price of their gas to a point even within 2d., 3d., or 4d. per 1000 cubic feet of the price at which this cheap fuel gas could be produced and supplied to the consumer, they would get what was the future of their undertakings—heating and power. He thought the commercial aspect must be taken into consideration, and that it was a proper thing for an Institution like theirs to add to its duties. It could, in fact, only be done by an Institution of the kind. The weight of influence necessary for them to go to their Committees and Directors could only be obtained by an Institution of this character, and not by simply a creation—however well intended—of 20, or 30, or 40 neighbouring towns. If the President could see his way to bring this matter before the Committee, and if the members were in accord with him, then he thought they would have taken a great stride in keeping their own industry on its right track.

The PRESIDENT said he would promise that the matter should be brought before the Committee at their next meeting for careful consideration.

Mr. WHATMOUGH, replying to the discussion, said the members all seemed to be in accord with each other that it was desirable something should be done to increase the price realized for coke. Mr. Hutchinson said that he (Mr. Whatmough) had not claimed for the broken coke all the advantages he might have done. If they sold broken coke as he had described in the paper, there was not the slightest doubt, as Mr. Hutchinson said, that the ordinary coke profited thereby; but, as he said in the paper, there was only one way of testing the utility of the system, and that was by taking the balance-sheet figures for both classes of coke together. He happened to be connected with one of the towns referred to by Mr. Meunier, and had attended one of the two meetings alluded to. It was desirable that something of the kind should be done.

Mr. BREARLEY said he would propose that the Committee take the question suggested by Mr. Meunier into consideration, and, if they thought it desirable, that the commercial side should be added to the work of the Institution.

Mr. H. KENDRICK (Stretford) said, as representing one of the towns subscribing to Mr. Meunier's scheme, he could assure the members that the benefits already received from the inception of the coke list had been very great indeed. Following up the remarks of Mr. Meunier, he could give one instance of the advantage of knowledge in these matters. He was to-day selling coke at the works at 12s. 6d. per ton. At a railway station two miles away, but in his district, coke was being delivered and sold from trucks at 10s. 6d., or 2s. less per ton than he was getting at the works. He had no coke in stock at all; and the people who were delivering the coke at the railway station could certainly get 14s. a ton for it, without inconveniencing him in the least. The idea of the scheme was not to bolster up the price of coke, but for each works to receive the full benefit from the prevailing market price, and yet at the same time not under-cut.

Mr. HUTCHINSON remarked that hitherto it had been held that the Institution should be kept as a technical or engineering body, and the commercial side excluded. Mr. Meunier's proposal was a very wide departure from custom and practice; and he hoped that every point which could be urged *pro* and *con* would be fairly weighed before a decision was come to.

Mr. MEUNIER said the Committee would take the question up with the knowledge that it was the wish of the members that it should be brought to a conclusive end if at all possible.

The motion was unanimously carried.

VOTES OF THANKS.

A hearty vote of thanks was passed to the authors of the papers; and both Mr. HUDSON and Mr. WHATMOUGH responded—expressing their pleasure that their contributions had been so well received, which rewarded them for the time and trouble expended in their preparation.

Acknowledgment was also made of the services of the officers and retiring members of the Committee, on the motion of Mr. C. ELLIOTT (Leyland), seconded by Mr. E. SIDWELL (Winsford).

Before separating, the members had tea together.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by correspondents.*]

Inclined v. Horizontal Retorts.

SIR,—The figures given by Mr. Edward Drory, of retort-house working in Berlin, are very interesting and clearly stated; but I differ from you when you say they touch the precise spot upon which discussion exists as to inclined *versus* horizontal retorts with machinery. As a comparative estimate of the cost of carbonizing in the various works named, they are no doubt valuable to Mr. Drory; but to anyone not possessing a complete knowledge of the works in question, they do not go far towards settling which system of carbonizing is the most advantageous.

To take a few of the details given. Why are 40 cokemen required per day with the machines, to handle exactly the same quantity of coke as is handled by 22 cokemen with the inclines? Why are 56 pipemen, lidmen, &c., required with the machines, when 4 men are sufficient for the same work with the inclines? Why are double the number of firemen required to attend to the heating of the retorts charged by the machines, when only the same quantity of coals are carbonized in each case?

All these extra men may be necessary at the particular works for which the figures are given; but, to my mind, the need of them does not bear on the question at issue. The figures only show that, at the new works, they have made great improvements in the method of handling the coke, the arrangements of the hydraulic main and ascension-pipes, and also in the heating and size of the retorts. But why put all these improvements to the credit of the inclines? They can be as easily and profitably applied where horizontal retorts are used and machines employed for stoking.

With regard to the work done by the machines, the figures show these must be working under most disadvantageous conditions. An average of 32 charges per machine per hour is very poor work; and the number of men employed (20 machine hands and 30 helpers) is very high. In any well-constructed and suitably arranged retort-house to deal with the same quantity of coal in the time stated, four pairs of machines ought to do the work easily. This would mean working twelve-hour shifts, say—

2	Foremen.
16	Machine hands.
16	Helpers (also attending to lids).
8	Pipemen.
16	Firemen (if necessary).
4	Engine and elevator men.
2	Machinists for hydraulic pumps.
3	Enginemen for hot-coke conveyors.
67	Men in 24 hours.

At the rates quoted by Mr. Drory, the comparison would then be—

For Horizontal Retorts with Machinery.	For Inclines.
67 men in 24 hours.	78 men in 24 hours.
£16 7s. 4d. ,,	£20 7s. 10d. ,,
6·87d. per ton.	8·56d. per ton.
8·54 tons per man per day.	7·32 tons per man per day.

With the exception of the item for hot-coke conveyors, which is put in for the sake of comparison, these are not fancy figures, but given from practical knowledge of what can be easily done by horizontal retorts and machine stoking worked under suitable conditions.

In many instances, machine stoking has been applied to retort-houses where the full benefits of the installation can never be attained (although a large saving over hand work can be shown); but it is not reasonable to compare the results from these works with the results from installations of inclines where every piece of apparatus is of the most up-to-date order, and no expense has been spared to give the installation every chance of the most successful working.

Where both systems start equal—with suitable retort-houses, and all the necessary appliances made and arranged in the most approved way—it will be found that in large works horizontal retorts with machine stoking have still a long lead over any other system.

ALEXANDER WILSON.

Dawsholm, Glasgow, Feb. 28, 1902.

Inclined Retorts at Heckmondwike.

SIR,—At the Midland Association meeting on Thursday, Mr. H. P. Maybury referred to our installation of inclined retorts; and I ask leave to reply to his remarks at once.

Mr. Maybury assumes that the published cost of working slopers at Heckmondwike, of 1s. per ton, does not include coal-unloading or coke-handling wages. They, however, do include both. Our present carbonizing wages are slightly under 1s. per ton, which includes all wages paid for coal and coke handling, also those of the boiler and exhauster men.

It is, however, necessary to point out that our coke-handling plant has been so designed as to cost, generally speaking, nothing for attendance. Our coal is carted into the works, and tipped by the carter into a hopper, holding about 12 tons, let into the ground over the breaker, and it is automatically fed into the breaker and elevator. Therefore, our coal unloading and elevating costs nothing beyond the occasional starting and stopping of the steam-engine operating the plant, which (along with lubricating) is at present done by the exhauster men. Our overhead coal hoppers hold 36 hours' maximum requirements; so that the coal plant need not be run on Saturday afternoon, Sunday, or at night. When, however, coal has to be wheeled or thrown from the coal-stores (immediately contiguous) into the hopper, the cost will be increased by almost 1d. per ton.

At present, we are only working with three beds of slopers; when the other three are finished, and put to work, our total carbonizing wages all-told will drop to about 9d. per ton. There is little doubt that in working three beds of slopers only, we are at some disadvantage, as

in our case any increase or diminution, of even one bed, will lead to a decreased cost per ton on carbonizing.

Our coke-handling plant is automatic; and here also the only labour required is the starting and stopping of the steam-engine and water-sprays, which is done in the daytime by the fireman, and at night by the exhauster man.

Our hot-coke conveyor works exceedingly well; as also does the coke-elevator.

A. F. GOODSON.

Heckmondwike, March 2, 1902.

The Taxation of Depreciation.

SIR,—The letters published in the "JOURNAL," on the question of taxation of depreciation, are of great importance to all companies; of still greater importance is the question of a sinking-fund.

The officials for taxes are at variance with each other. In the case of Stafford, there have been a certain number of different decisions; and it would not perhaps be safe to consider the question as definitely settled. Such variations would be impossible if the officials' conduct was determined by principles of logic or fair and sound business.

The leading principle as to income-tax applied to companies is that only profit is to be taxed. From the gross receipts must be deducted all expenses or charges; and only the net profit can be dealt with by the officials. I think there is a general agreement on this point. My Company are working under a concession of 50 years, at the expiration of which time the whole plant goes over, free of any charge, to the City of Antwerp. This, of course, involves the necessity of providing for due amortization; and it is not possible to regard this amortization as anything but a regular charge on the concern. The first entry in our books each year, as a working expenditure, should be the sum to set aside for amortization. The shareholders' dividend can only come in for consideration after the sinking-fund has been provided for. Otherwise, the Directors could be blamed for paying undue dividends. Common sense and the law both say so; but the taxation officials are at variance with both, and consider the sinking-fund only as a way of disposing of profit. Accordingly, they want to levy income-tax on it. I entered a protest with the Belgian Government, and had no real difficulty in convincing the officials. Our sinking-fund, and the interest accruing from it, were exempted; and the tax paid for one year was reimbursed. I naturally expected the same result from the endeavours of my Directors in London; but they were not so fortunate as to make the English officials adopt the same course. My Company are thus in the singular position of paying no tax on amortization in Belgium, but having to pay it in England.

How unreasonable this is, can best be shown by taking an extreme case. Let us suppose a company in the same condition of concession, earning just enough to cover amortization—say, £3000 a year. After 50 years, the shareholders will get back their capital; but they will have lost interest on it during 50 years. This is bad enough. But the taxation officials want to make it worse; they come and take 1s. in the pound—or £150 yearly—which at 3½ per cent. makes £19,650. The Government have taken away part of the capital. The term "cruelty" seems not an exaggeration. How such an action can be reconciled with equity, I fail to see.

It is the most disagreeable study of the taxation officials to make people pay; and no doubt their task is often a difficult and most unpleasant one. But no reasonable blame can attach to them, if they discharge their duty, even in a spirit of severity and consciousness. On the other hand, the public have a claim upon their sense of equity; and nothing seems more reasonable than to ask them to reconsider their decision with regard to the sinking-fund, in a really businesslike way.

AD. KEMNA,
Manager, Antwerp Water Company.

Antwerp, Feb. 27, 1902.

Incandescent Burner Maintenance.

SIR,—I am glad to see that this subject is attracting attention, being convinced that it is an excellent method not only for retaining present lighting business, but for securing considerable extensions. Not having had any working experience with the partial system, I prefer to say nothing for or against it; but, after two years' working with the inclusive system, I can say that the difficulties anticipated by Mr. Cornish have not been realized. I strongly advise a practical trial before accepting such anticipation as an objection. The consumers have as much interest in the care of mantles as the company, as they should be made to understand that the success or otherwise of the system depends upon their co-operation. In all cases, we have found them perfectly reasonable on this point; and our consumption of mantles does not exceed that recorded by your correspondents. We have some 2500 burners in hand, and find a charge of 2s. per burner per annum sufficient to cover expenses.

N. H. HUMPHRYS.

Salisbury, Feb. 28, 1902.

The Price of Incandescent Mantles.

SIR,—In support of what Mr. F. D. Marshall has said as to the cost of mantles, I may inform you that I have bought locally a good burner, mantle, a chimney, and a fork for the modest sum of 6d. I have tested it with the following results (quality of gas used 15·64 candles):—

Pressure . . . inches	1	1½	2	2½	Length of mantle exposed to gas 2⅜ inches.
Illuminating power, candles	62¼	81¼	82	79	
Gas consumed . cubic feet	3·2	3·8	4·5	5·0	
Candles per foot . . .	19·1	21·3	18·2	15·1	

These results were obtained without any alteration of the burner; but with better air adjustment, over 90 candles was obtained at 2-inch pressure for 3·8 cubic feet of gas consumed per hour. The box containing the mantle bore the words "Made in Germany." The cost of a Welsbach mantle alone exceeds this complete fitting; and the "C" burner does not emit so much light per foot of gas consumed.

Other examples might be cited to show that the price of 3d. given by Mr. Marshall would produce a good profit to not only the manufacturers, but to retailers.

W. GRAFTON.

East Ham, March 1, 1902.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress has been made with Bills:—

Bill read a second time: Swindon United Gas Bill.

Petitions have been presented against the following Bills: Bradford-on-Avon Gas Bill, Consett Water Bill, Weardale and Shildon District Water Bill.

The Wrexham Water Bill and the Ystradfellte Water Bill have been referred to a Select Committee, consisting of Lord Elgin (Chairman), the Earl of Stamford, the Earl of Bradford, Lord Carew, and Lord Shute; to meet to-day.

The Birmingham Corporation Water Bill, Darley Dale Water Bill, Devonport Corporation (Water) Bill, and Devonport Water Bill have been referred to a Select Committee, consisting of the Earl of Dartrey (Chairman), the Earl of Malmesbury, the Earl of Verulam, Lord Lilford, and Lord Headley; to meet to-day.

HOUSE OF COMMONS.

Thursday, Feb. 27.

LONDON WATER BILL.

On the order for the second reading of this Bill,

Mr. BUXTON moved, as an amendment, "That this House, while welcoming the adoption of the principle of purchase and the creation of a special Court of Arbitration, is of opinion that the authority proposed to be created for the purchase and control of the water supply of London is unsatisfactory and unworkable, and repugnant to the general principles of municipal government." He said it was with very great regret that he found it necessary to move his amendment, as he had hoped they had arrived at some substantial agreement during the last year or two with regard to some of the principal points in dispute with respect to the water question, and that a measure would be brought forward which, even if it did not go so far as they wanted, would be acceptable with a view to amending it. But the proposal of the Government, both with regard to finance and the authority they proposed to establish, was not a real contribution to the settlement of this question. If the Bill were passed in its present form, the last state of the London water consumer and ratepayer would be worse than the first. He would rather be at the tender mercy of the Directors of the Water Companies, than buy their undertakings at an extravagant rate, and place the administration in the hands of a very inefficient body. He should prefer that the Bill should be lost if it could not be amended; and therefore he intended to give it his most strenuous opposition. The question of arbitration and the way in which the price was to be fixed had been the real *crux* in the past; and in the proposal of the Government, it did not seem to him clear what was the actual reference to the Court of Arbitration. There was nothing in the Bill to show that the Court was to take into account all the circumstances of the case. It seemed to him that in regard to the question of price there ought to be two distinct operations. It was in the competence of the Court of Arbitration to ascertain and declare the value of an undertaking in cash; but, in his opinion, it was outside their competence to say that the shareholders ought to receive a certain amount of water stock in lieu of their present capital. It ought to be left to the Water Board to decide whether they would pay in cash or in stock, and what form that stock should take. The proposals of the Government had unfortunately led to the inference, as was clear from the price of the shares, that there was going to be an alternative stock, and that for every £100 of water stock the holders of it would receive £100 of secured 3 per cent. water stock. He trusted the right honourable gentleman would repudiate this inference which had been drawn from his proposals. To give for the present fluctuating stock this secured 3 per cent. stock, would certainly be an outrageous proposal. He was not surprised that there should be an idea outside that the price which the Companies would obtain for their property would be a very fair and a very high one. The one body which had information upon this subject, and could deal with it—the London County Council—was specifically excluded from the Bill. It would have a slight voice in any agreement for purchase; but when it came to arbitration, it would be excluded altogether. If the measure had been carried out on municipal lines, and recognized the Central Authority, he possibly might have supported the Bill, even though it did not entirely carry out his own views. But the proposals of the right honourable gentleman were of such a fantastic character that he for one could not see his way to support them. They were contrary to the principle of modern municipal life—namely, that of direct representation; and it was certain that they would never have been suggested in regard to any of the great municipalities in the country. He did not think the proposals of the Government would in any way increase the public interest and control which were essential to good management. Having discussed the constitution of the proposed Board, the honourable member said he believed that the financial part of the Bill would cost the public dearly, and that the Board proposed, by being unwieldy, ineffective, and unrepresentative, would prove dearer than all.

Captain NORTON seconded the amendment.

Mr. WHITMORE said he would support the second reading of the Bill as one who, on many previous occasions, had opposed to the best of his ability measures brought forward by the London County Council for dealing with the Water Companies. The last Royal Commission reported emphatically against the Council being the purchasing authority. He admitted that he would have preferred an amalgamation of the Companies; but apparently they were either unable or unwilling to amalgamate, and hence an alternative had to be considered. He was glad, under the circumstances, that the Government had taken action, for the water question was important in the public interest. As much of the efficient working of the scheme would depend on the

selection of the Chairman and Vice-Chairman, and there might be some difficulty in the way of a large and newly-constituted body making the best possible selection, it might be a public advantage if the Government, through the Local Government Board, appointed the first Chairman and Vice-Chairman of the proposed Board. He would also suggest that all the constituent bodies should have the optional power of electing as their representatives on the Water Board gentlemen from outside their own ranks.

Dr. MACNAMARA thought the arbitration clause in the Bill should be a little more precise in its terms—setting forth, for instance, that the Arbitrators should award a fair and reasonable value of the undertakings, *plus* the cost of the reinvestment of the money, should any shareholders elect to take money. He would remove from the Bill all provision for settlement by agreement, having no confidence in the Water Board to arrive at a fair arrangement by this method. Everything should be done by the Court of Arbitration, in whom he had every confidence.

Mr. BOULNOIS said, from the point of view of the Water Companies, there were three main objections to the Bill. It set up, in the first place, a novel and unheard-of Court of Arbitration. In the second place, it established a principle of expulsion which he must describe as unjust and unreasonable. In the third place, it ignored and discarded nearly all the recommendations of the last Royal Commission. As to the first objection, he contended that it was unfair to establish a Court of Arbitration from which there was no appeal. There was no instance on record where an owner of property had been deprived of it without the right of appeal to a Court of Justice. Again, the Companies had no voice or choice in the naming of the Arbitrators; and he could not conceive why an exception to the recognized usage had been made in this instance. If it was because the interests involved were so vast, then he held that it was monstrous to say, because the stakes were high, that the rights of property should be discarded. There was no evidence that the Companies had not done well. On the contrary, notwithstanding that they had been hampered and worried by Parliament and the County Council, they had been successful, and deserved well of the community. It was, indeed, because they were successful that covetous eyes were cast upon them. The usual conditions of purchase in this country should not be departed from. The Bill established a principle of transfer which was very novel indeed. It proposed to take over the whole of the undertakings on the 1st of January next. He contended that this would be found impossible, as the Board had to be elected, brought into operation, and all the machinery set in motion. On what principle of justice, he asked, were the Companies to be deprived of their undertakings before a price was fixed? The purchase of these undertakings was inadvisable altogether, and the Bill was unnecessary. He had been told that his position as a London member and as Chairman of a Water Company was inconsistent. But he had been four times elected by increasing majorities while being Chairman, and therefore he saw no force in that argument. In opposing the Bill, he believed he was acting in the best interests of London ratepayers generally, and those of his own constituents in particular. The London ratepayers could derive no benefit whatever from the transfer of the water undertakings. In the process of the equalization of rates, there would be a levelling up, and not a levelling down; and he quoted from the report of the Royal Commission to show that a sum of £600,000 a year would have to be found either by water-rate or borough-rate. The Bill had no provision in it for a water-rate; and the policy of the new Board might be to distribute water for nothing. Such was the doctrine which had been preached from Socialistic platforms; and he felt pretty certain it would find approval on the London County Council. Unfortunately, the people of London listened to the sophistry emanating from Spring Gardens. He opposed the Bill as being bad for those whose property was proposed to be appropriated, bad for the ratepayers whose burdens it would increase, and bad for the Government whose reputation it would diminish.

Sir R. REID welcomed the clauses in the Bill which provided that no extra sum should be paid to the Companies in consideration of compulsory purchase, and that nothing was to be allowed for the enhancement or depreciation of the shares caused by the passing of the Bill. He considered, however, that the measure of justice these clauses contained was jeopardized by the provision relating to the purchase price, which would seem to put a bonus into the pockets of the shareholders—a course which would be unfair to the ratepayers.

Major RASCH said, as the Chairman of a Water Company within the Metropolitan Police area, he had faith in the proposed Water Board and in the Arbitrators; and he could not believe that a Government who had behaved so nobly to the Hungarian horse copers would act less generously to the Water Companies.

Mr. HALDANE criticized the constitution of the proposed Board, and predicted friction as the result of its operations.

Colonel LOCKWOOD remarked that, though the principle of purchase was now an accepted theory, he was opposed to the compulsory acquisition of private property by the State. He looked upon State purchase as the elder brother of municipal trading; but as this principle had also been accepted by the House, he had come to the conclusion that there was no desire on the part of the Government to confiscate the property of the Water Companies, but to deal fairly with them. Did the Bill carry out this intention? He maintained that it did not. In his opinion, the Bill was not bad all through, but the Government had followed the recommendations of the Llandaff Commission only so far as it suited them. The shareholders of the Companies should be dealt with fairly, and they should be recouped the value to them of their undertakings. He objected that the Bill materially and prejudicially departed from this principle, first of all in the method of arriving at the price, and next in the mode of transfer. There was no rule laid down guiding the arbitration. He submitted that there would be no difficulty in amending the Bill by incorporating the Lands Clauses Act as the guiding principle of its operation. The Government reserved the power of postponing the transfer for a year. In the event of the Bill receiving the Royal Assent in August, and it being found impossible to begin operations before December, the Local Government Board ought to consider the propriety of postponing the date of transfer for one year more, and giving one year after that, at the discretion of the Local Government Board. The Water Companies had a right to claim that the Government, having adopted so many recommendations of the Royal Commission, should go still further and adopt the principal one of the whole—the Lands Clauses Act—the essence of which was that the price paid should recoup the man who sold the value to him of his property.

The debate was continued by Mr. Whitely, who argued that the Bill set up a sham local control, and said that if it should pass in anything like its present form, it would lead to neither efficiency nor economy; and the last state of the water supply of London would be worse than the first. Mr. Hay, on the contrary, supported the Bill as a fair and reasonable solution of a difficult question. Mr. Remnant remarked that, assuming the policy of purchase was to be adopted, surely it was only reasonable that the Water Companies should be dealt with in the manner in which private undertakings had hitherto been treated when, in the public interest, they were compulsorily purchased. He would go so far as to say that the 10 per cent. under the Lands Clauses Act should be allowed. The date of purchase was fixed for Jan. 1, 1903; but it was almost impossible that terms could be arranged by that date, and therefore he hoped that the limit of time would be extended to Jan. 1, 1904.

Mr. MELLOR, as a member of Lord Llandaff's Commission, reminded the House of the constitution and labours of that body, and expressed his astonishment that the Government had paid so little regard to their recommendations. The Commission came to the conclusion that the Water Companies ought to be bought out by a public authority; but the important question was how they were to construct it. The Commission recommended that there should be a Board of 30 members, selected on account of their business capacity, and, if possible, their knowledge of matters connected with water supply. They were, in fact, in favour of a small Board of capable men who would administer the affairs of the Board economically. This recommendation had been ignored by the Government, who had constructed a sort of debating society, who would be too busy contradicting each other to administer their affairs with success or economy. He regretted that the money of the ratepayers should be wasted in this way. He did not see why the suggestion of the Commission with regard to the Lands Clauses Act had not been acted upon. All that was provided under that Act was that a man who had his property taken from him should be indemnified. This, he understood, was exactly what the House wished in this matter; and it was common sense as well as common justice. If the Government would reform the Water Board in the direction he had indicated, and would alter the clause with regard to compensation, he thought their difficulties would disappear. They would satisfy those who were interested in the Bill on behalf of the London County Council, and those who took an interest in it on behalf of the Water Companies; but, beyond all, he believed they would satisfy the London ratepayer, whose interests ought to be considered in so important a matter as this.

Sir J. DORINGTON said he wished to endorse what had fallen from his right honourable friend and colleague on the Royal Commission, especially in regard to the arbitration clause. He did think that clause as now drawn was a distinct contradiction of all that the members of the Royal Commission contemplated. He hoped the Government would give definite directions that the Arbitrators should proceed under the Lands Clauses Act. With regard to the constitution of the controlling authority, the Commission were obliged to put the London County Council out of court, simply for the reason that that body did not govern the district which was to be supplied with water, but only a portion of it. Another feature that was very strongly presented to the Commission was that the outside districts would on no account consent to be administered by London. They claimed their share in the administration; and many of them asked that, if any such thing should be done, it should be done either by severance of works or by supply in bulk. Severance or supply in bulk was most clearly and distinctly shown to be absolutely impracticable. The Commission had therefore to construct a Board; and this was the first point at which the scheme of the Commission differed from that of the Government. At that time, London did not possess the Metropolitan Boroughs which existed now. What they might have done if the boroughs had been factors in the case, he could not say, except that he was quite certain they would not have created a Board of 67. Another distinction between their scheme and that of the Government was that the Commission did not suggest that necessarily the members of the Board should be actually members of the bodies they represented. He would like to lay considerable stress on the suggestion of his honourable friend the member for Chelsea (Mr. Whitmore) that, at all events, the first Chairman and Vice-Chairman of the Board should be appointed by the Government. The recommendation of the Commission was that they should always be appointed by the Government; and he thought there was sound reason for it. With regard to the payment by water stock, he thought such a provision was both fair and better in the interests of the general public, and not detrimental to the recipients of the water stock. As to the appointed day, he could not help thinking that this was an unnecessary complication in the Bill. He should like to get rid of the appointed day altogether; and supposing the provisions of the Lands Clauses Act were properly incorporated in clause 18 of the Bill, the appointed day would almost naturally drop out, because, as the Arbitrators settled each case, they would also settle on which day that particular part of the property would be taken over. It would be, on the whole, very much better for administration that the new Water Board should take up, piece by piece, the several items of which its whole work was going to consist. With good temper and good will, the thing would go through quite smoothly; and at the end of a reasonable period—he would not say one year—they would find that the whole of the Water Companies had passed into the hands of a public authority without injury to any person, and to the general satisfaction of the community.

After some remarks by Mr. Lough and Sir W. Hart-Dyke,

Mr. GRANT LAWSON (Parliamentary Secretary of the Local Government Board) contended that the Bill contained the elements of a fair compromise. Many of its details had been criticized, but these could be settled in Committee. The transfer of the Companies' property need not be effected by Jan. 1, 1903, as some members imagined. The transfer could be deferred for another year, if it was

thought desirable. Justifying the leading principles of the measure, he reminded the House that for the last 33 years Commissions and Committees had one after another recommended that the water supply of London should be controlled by one public body. The scheme of the Government gave the London County Council a representation of ten members on the new Board—which was five times greater than that given to any other body. The Council, of course, were not satisfied, as they desired to get the whole control of the water supply into their own hands. The only way in which to satisfy the majority of the Council would be by acting on the principle of the Scotch miser—"Take everything from everybody, and give it all to me." Having shown that there were strong administrative and financial reasons for the representation of outside districts, he denied that the Board would be so large as to be unworkable. It was to be constructed on the principle that taxation and representation should go together. Dealing with the arbitration proposals of the Government, he argued that the shareholders would derive no additional security by the incorporation of the Lands Clauses Act in the Bill, which he urged was a fair and honest effort to arrive at a compromise on what was, at any rate, an exceedingly difficult question.

At midnight, the debate was adjourned till yesterday.

The following further progress has been made with Bills:—

Bills read a second time and committed: Barking Gas Bill, London Water Bill, North Warwickshire Water Bill, Reading Gas Bill, Shepton Mallet Gas Bill, South Metropolitan Gas Bill.

Bill reported, with amendments: Wadhurst Gas Bill.

COURT OF REFEREES.—Friday, Feb. 28.

BROMLEY GAS BILL.

This Bill came before the Court to-day—Mr. PARKER SMITH presiding—on a petition presented by the Crays Gas Company to be allowed to be heard against it when in Committee.

Mr. CLARK WILLIAMS, in support of the petition, said the circumstances were very peculiar. The Bromley and Crays Gas Companies both obtained Acts in the 1865 session of Parliament; and these Acts covered three parishes in common. Before the Bills went through, however, the parties met and made terms partitioning the parishes, so that there should be no competition. The parishes developed; and for about thirty years the agreement was strictly observed. Then the Bromley Company repudiated the agreement, and proceeded to undersell the Crays Company in parts of the three parishes which had been allotted to them, particularly at the workhouse and a large brewery. The Crays Company took the matter to the Courts, and, on appeal, the agreement was sustained; the result being that now the Bromley Company could not supply gas in certain parts of the three parishes which were defined in the judgment. The Crays Company contended that the use by the Bromley Company of the term "limits of supply" in their present Bill, would lead the Committee who would have to consider the Bill to think that they were authorized by law to supply gas in the whole of the three parishes; and they therefore submitted that the Bromley Company, in their Bill, should take notice of the decision of the Court, or at least that the Crays Company should have power to be heard before the Committee, in order to obtain the insertion of a clause upholding the agreement. The Bill was being opposed by the Bromley Urban District Council; and the probability was that Parliament would restrict the promoters to their own limits of supply, more particularly as part of the power sought was to supply electrical energy which was absolutely unprecedented on the part of a gas company—Parliament never having given power to a gas company to supply electricity over an area of unlimited extent. If such restriction were inserted, as far as the Committee would know the limits of supply were those mentioned in the Act of 1865; whereas, by the agreement, they were less. A further ground of *locus standi* was that the Bill would enable the promoters to compete with the Crays Company, as they had already, contrary to the agreement, tried to do in the case of gas, by offering to supply electricity to the brewery and workhouse.

The CHAIRMAN: Clause 38 (which relates to the supply of gas in bulk) can only come into operation with your consent.

Mr. CLARK WILLIAMS: If it is only with our consent, it is not necessary. If they want any express power of that sort, we ought to be heard against it.

Mr. CLAUDE BAGGALLAY, K.C., in replying for the Bromley Gas Company, referred to the sections of the Bromley Company's Act of 1865, which defined the limits of supply, and which enabled them to agree with another company as to limits of districts. What the agreement referred to by his learned friend was, in terms, the Court had to declare on oral evidence, because the document had been lost. He would assume, however, that the agreement was binding, and that the original document would not be found.

Mr. HEYWOOD JOHNSTONE: Your position is limited by the agreement until it is dissolved by mutual consent?

Mr. CLAUDE BAGGALLAY: Yes.

The CHAIRMAN: I do not think we need trouble you further, Mr. Baggallay. The *locus standi* will not be allowed.

Trade Water at Bradford.—As far as we are aware, the question of the charge for trade water at Bradford, to which reference was made in the "JOURNAL" a few weeks ago, is still under the consideration of the Water Committee of the Corporation. It appears that the city is now receiving upwards of 20 million gallons of water per day, while the consumption is about 13 million gallons. Consequently, a large quantity is being wasted. A former member of the Corporation (Mr. R. Shackleton) points out that at the present time there are firms pumping up water to the extent of more than 3 million gallons per day. The cost of raising and softening the water may be reckoned at 3½d. per 1000 gallons; and Mr. Shackleton believes that if the Corporation would supply the firms with water at 4d., they would no longer pump, and the city would receive a substantial addition to its revenue.

HOUSE OF COMMONS COMMITTEE.

Thursday, Feb. 27.

(*Before Mr.* W. S. CAINE, *Chairman, Colonel* LONG, *Mr.* FITZALAN HOPE, *and Mr.* GEORGE LAMBERT.)

ABERCARN URBAN DISTRICT GAS BILL.

The Hon. J. D. FITZGERALD, K.C., and Mr. HONORATUS LLOYD appeared on behalf of the Abercarn Urban District Council; and Mr. RAM, K.C., represented the Abercarn and Newbridge Gas Company.

Mr. FITZGERALD, in opening the case for the promoters, said the object of the Bill was to acquire, by purchase, the undertaking of the Abercarn and Newbridge Gas Company. The Company had a capital of £7380; but the whole of this, with the exception of £300, had been called up, and they were really at the end of their resources. During the last two years, the Company had made no profit on their trading; and in 1900, in consequence no doubt of the high price of coal, they had made an absolute loss. There was no question that the proposal of the Council would be to the advantage of the Company as well as to the benefit of the district. The Directors had intimated that they were willing to sell; the only question between them, and the only question for the Committee, was the price which should be paid.

Mr. RAM (interposing) said he thought he might relieve the Committee of some trouble in the matter. There had been negotiations between the parties for some time; and he thought if the Committee would grant a short adjournment, a satisfactory arrangement could be arrived at.

The CHAIRMAN: I think you might have settled the matter before coming into Court.

The parties adjourned, and, after a brief interval,

Mr. RAM stated that the Company had been able to come to a complete agreement with the promoters. The price and terms had been agreed upon, which would be put into clauses. Efforts had been made to come to an arrangement, and many persons had been consulted; but it was only now that they could arrive at an agreement.

Mr. FITZGERALD agreed with Mr. Ram as to the arrangement. He thought his friend could hardly ask him to give the Company a good character; but he would say nothing against them.

Mr. RAM said the price agreed upon was £10,875, and the Council would acquire the undertaking on June 24. Clauses embodying the terms would be framed and presented to the Committee next day.

Friday, Feb. 28.

The Committee resumed its sittings this morning, when the new clauses were presented and agreed to. Among them were a protection clause for the London and North Western Railway Company, and clauses as to the winding-up of the Company. The purchase clause recited that the Company should sell to the Council, at the price of £10,875, their undertaking, and the Council should pay the purchase money on June 24, or within one month of the passing of the Act. The Council should pay interest at the rate of 4 per cent. on the monies unpaid, and should be deemed to have carried on, and to be carrying on, the undertaking from the date of the transfer. All rents, profits, and outgoings current at the date of the transfer, should, so far as might be necessary, be apportioned between the Company and the Council; and the latter should also pay to the Company a sum equal to the aggregate amount of all capital expenditure which the Company might incur, with the consent of the Council, between Feb. 27 and the date of transfer. All the stocks and plant were to be taken over at a valuation.

The remaining clauses were examined by the Committee, and the Bill was ordered to be reported for third reading.

HOUSE OF COMMONS COMMITTEE.

Thursday, Feb. 27.

(*Before Sir* SAVILE CROSSLEY, *Chairman, Mr.* TENNANT, *Captain* JESSEL, *Mr.* SOARES, *and Mr.* BONHAM CARTER, *Referee.*)

BROADSTAIRS GAS BILL.

Mr. BALFOUR BROWNE, K.C., and Mr. ERNEST MOON appeared for the promoters, the Broadstairs Gas Company; while the petitioners against the Bill were represented by Mr. WEDDERBURN, K.C., and Mr. HUTCHINSON, for the Broadstairs and St. Peter's Urban District Council, and Dr. C. HERBERT SMITH, for private petitioners, including the owners of the land on which the Company's new works are proposed to be placed.

Mr. BALFOUR BROWNE, in opening the case, said the promoters had supplied Broadstairs with gas for a considerable number of years, and were incorporated by Act of Parliament in 1875. The capital under the Act was £12,000—£6000 raised by ordinary shares at 10 per cent. and £6000 by additional shares at 7 per cent.; and the borrowing powers were £2000. In 1883, by means of a Provisional Order, they obtained power to raise further capital of £20,000, with a dividend of 7 per cent.; and the borrowing powers were increased by a further £5000. The illuminating power of the gas was 14 candles, which was amply sufficient. Since 1883, the Company's business had gone on increasing. In 1890, they had 450 consumers, and in 1901 they numbered 1184. In 1890, the quantity of coal carbonized was 1942 tons; and in 1899, 4318 tons. In 1890, they sold 20 million cubic feet of gas; and in 1900, 46,300,000 cubic feet—being an increase of close upon 130 per cent. The Bill therefore sought powers to raise £60,000 of additional capital, and to secure a new site for the Company's works. The site was objected to by the Urban District Council; but he would be able to show that it was the best and cheapest obtainable, and was not, as suggested, likely to interfere with the attractiveness of the town. The standard price of gas was 4s. 4d. per 1000

cubic feet; but the Company were only charging 3s. 3d., by which both the Company and the consumers benefited under the sliding-scale system. The petitioners stated that £60,000 additional capital was too large. But owing to the rapid growth of Broadstairs, it would only last for about fifteen years; and it was very desirable that a small Company should not have to come to Parliament frequently. The Urban District Council suggested an alternative site; but the one proposed by the Company had been in the market for twenty-five years, and was not likely to become residential, as it was near the railway. They also wished the candle power to be increased to 15. The matter of gas, however, had been thoroughly inquired into; and, as a consequence, the South Metropolitan Gas Company had had their 16-candle power reduced to 14 by Parliament. That was because a highly illuminating gas was not required. The illumination was now known to depend, not upon its enrichment, but upon the burner used. The Welsbach burner turned 10-candle gas into 60-candle power. The Council submitted that if the Bill did receive sanction, provision should be made for enabling them to purchase the undertaking. From beginning to end, there was not a single complaint against the Company; yet the Council, contrary to precedent, asked for a purchase clause. That had not been granted in a single case with regard to a statutory gas company, although it had been done with non-statutory companies; and the Council had never received the sanction of the ratepayers to such a step.

Mr. *Lazarus Hart*, Chairman of the Company, was the first witness called. He corroborated Counsel's opening statement, and maintained that the site selected for the new works was the best available.

In cross-examination by Mr. WEDDERBURN, witness denied that the class of house near the present site was a poor one, and said the works were within 300 yards of the sea-front, where some of the best houses in the town were situated. Yet there had never been any complaint of the works. The neighbourhood of the proposed new site was laid out as building land, but had no buildings upon it; nor was it likely to have, on account of its proximity to the railway goods yard. This goods yard, of course, was actually an advantage to the Company, as it would provide facilities for obtaining their coal.

Mr. *F. Higginson*, Engineer, Manager, and Secretary of the Company, said that in 1893 they commenced to supply penny-in-the-slot meters. Some 454 customers took the gas in this manner; and 1 494 cookers were supplied. There were about 16½ miles of mains. It was a scattered district, and a considerable length of mains had been put in to meet the development of the town. The capacity of the carbonizing plant was 220,000 cubic feet per twenty-four hours, and the amount they were required to supply was 213,600; so that the maximum make was not very much more than the maximum demand. They were able to some extent to increase the capacity of the works; but that would not meet more than three years' demand. The principal portion of the £6000 capital spent in the last two years had been upon mains and meters. For some years the Company had been charging 3s. 3d. per 1000 cubic feet, and were doing so now; but last year it had been increased temporarily to 3s. 6d., on account of the price of coal.

The cross-examination of this witness, and also of the following one (Mr. Hinds) went to the question of the proposed site for the new works; Counsel for the petitioners suggesting it was a very objectionable one.

Mr. *H. E. Jones*, examined by Mr. BALFOUR BROWNE, said that he had advised the Company for some time on matters connected with their works. In view of the rapid increase of gas consumed, he calculated that in 1914 126 million cubic feet would be required. Therefore, further works were necessary. As to the choice of site, he had carefully considered the matter, both recently and four years ago. He sought, as he did at Margate, Cromer, and other places, as low a place as possible, so that the works should not be visible. Witness then explained the reasons which had influenced him in his decision as to the site—one being the proximity of the goods yard. The site suggested by the Urban District Council was certainly far more objectionable from every point of view. No injury would be done by the gas-works at the place proposed by the Company. A well-conducted gas-works was not objectionable to cottage property up to £28 or £30 a year. On the contrary, it was an attraction, because people got employment at the works. He did not consider the capital asked for was excessive. The raising the candle power from 14 to 15 would be actually a disadvantage to the consumers. What was wanted was cheap gas. The Welsbach burner gave 60-candle power from 12-candle power gas.

Mr. BALFOUR BROWNE: The question of luminousness largely depends upon the burner?

Witness: Yes. The gas of the future will not be the Mond gas, because that is too weak for general service—it would work in manufacturing districts; but we are going to aim at an 8 or 10 candle power gas, which will be produced and sold at 1s. per 1000 cubic feet less than ordinary illuminating gas.

And if you can get it cheap, it will be used largely for manufacturing purposes?—Yes.

With regard to the suggested clause for purchase by the Council, what have you to say?—There is no case of a statutory company being compelled to part with their undertaking in that way.

And even if there were, it must be for some cause shown of ill-doing or bad management, or something of the sort?—Yes.

As to the petitions of private owners, do you think the ordinary compensation for taking land compulsorily meets their case?—Yes.

In cross-examination by Mr. WEDDERBURN, witness said that the aim of all District Councils was to make opposition, as was being done in the present case.

Mr. WEDDERBURN: Do you know that the Town Council were unanimously against this Bill, and that at the meeting of the ratepayers they were against it, and the only ratepayers who were in favour of it were the Gas Company's employees?

Witness: How many people did you have present at this particular meeting?

Mr. WEDDERBURN: That we will give in our evidence.

Mr. *Robert Porter* gave corroborative evidence. He had chosen the site before Mr. Jones was called in; it was the only one available in Broadstairs. To remove the works elsewhere would be a great tax upon the consumers, as the price of gas would be increased. The site proposed by the Council was too small, and was far inferior in many ways.

Friday, Feb. 28.

Mr. *Robert Porter* was further examined. He produced photographs of the proposed site and the surrounding neighbourhood, to show its suitability for the gas-works.

In cross-examination by Mr. WEDDERBURN, witness said he had not consulted the Urban District Council whom he thought had petitioned against the Bill without giving any consideration to the matter. He denied that the proposed works would be visible from the Broadstairs promenade. Asked why he considered the proposed site suitable for a gasholder and a cemetery, witness replied that strong objection had already been taken to the site for building purposes. In reply to further questions, he stated that if the proposed works were taken to the site suggested by the opponents, the whole of the distributing plant would require re-organization.

The CHAIRMAN (interrupting) said that the Committee considered that the Bill hung on the proposed site.

Mr. WEDDERBURN said that if that were so, his learned friend on the other side should not be allowed to say that this was the only site, because if he did, it would compel the opponents to go into the question of an alternative site.

The CHAIRMAN: This is the only site the Committee will consider.

Mr. *W. H. Northover* gave evidence for the Bill, declaring that the nearest house from the proposed site was 250 yards He did not think that the works under the Bill would be offensive to the Bank's property, or would seriously affect the land of the Lloyds Trustees, which had been in the market as long as he could remember.

Mr. *E. H. Stevenson*, replying to Mr. BALFOUR BROWNE, said in 1894 he was consulted by the Gas Company, to assist them in their application to the Board of Trade for the acquisition of a plot of land which they had agreed to buy from the Lloyds Estate. He told the Company at the time that, so far as his experience went, the Board of Trade would not grant that site, because of the opposition that would be raised by the neighbouring owners and occupiers. The result was exactly what he foresaw. He had since advised the Company that the site now proposed was the only suitable one in the whole district for the purpose for which it was required. In his opinion, it was the only site to which coal could be taken in large quantities without having to be carted through the streets. The present works of the Company were so cramped as to be dangerous, and liable to create a nuisance. With regard to the capital powers of the Bill, he did not think the Company were asking for an undue amount. The site was the best, not only for the Company, but for the Local Authority and the people of Broadstairs.

In cross-examination by Mr. WEDDERBURN, witness said that where schemes like this were proposed to be forced on a district, the district authority and ratepayers and residents sometimes objected. There had never been such a case where objection had not been taken.

Mr. WEDDERBURN asked witness if it was not the fact that the only people who could claim compensation were those whose land would be taken, or whose land would be injuriously affected, and not those who had existing works in their midst.

Mr. BALFOUR BROWNE: Oh! yes; the latter can claim.

Mr. WEDDERBURN: I was not asking you.

Mr. BALFOUR BROWNE: If I put up a structure which obstructs the view of the people who are living in the neighbourhood, they can claim. On the other hand, they cannot claim for the carrying on of the gas-works, unless the works come upon their land.

In further cross-examination, witness said that the Company were proposing to treble their capital by increasing it from £39,000 to £120,000. He agreed that Broadstairs was rapidly growing, and stated that the consumption of gas was also increasing. Gas was being used there for various purposes. It was being adopted so largely for cooking that the growth of the town did not increase proportionately with that of the gas undertaking.

In re-examination by Mr. BALFOUR BROWNE, witness said he seldom heard of a proposal to erect new gas-works where there was not opposition—sentimental or otherwise.

This concluded the case for the promoters.

Dr. C. H. SMITH then opened the case for the private owners. He maintained that the scheme would prejudicially affect a valuable building estate—an estate worth a great deal more than the total of the capital of the Company. There was no public interest involved which would justify the over-riding of the rights of one set of private owners in favour of another set. He pointed out that the promoters had not brought a single responsible person from Broadstairs to say that the carrying out of the scheme of the Bill would not be a nuisance.

Mr. *Ellis*, who had managed the Lloyds Estate for twenty years, and several other witnesses, gave evidence in opposition to the Bill.

Mr. WEDDERBURN then presented the case of the Broadstairs District Council.

Mr. *H. S. D. Byron*, the Chairman of the District Council, said that the body he represented were opposed to the measure. The Council were of opinion that it was desirable that Broadstairs should be developed as a first-class watering-place, and the establishment of the gas-works on the proposed site would mean the erection of cottage property instead of villa residences in that part of the town, and would injure the amenities of the place.

Mr. MOON, for the promoters, asked if it was not true that, though the Council knew in the middle of November that the site had been selected by the Company, they never communicated with them, telling them that they considered it undesirable in the interests of the town, and that they did not decide to oppose the Bill un il Jan. 30?

Witness replied that it was quite correct to say that they did not write to the Company; and the reason they did not offer opposition till Jan. 31, was consequent on the amount of work that had to be done, and they did not see any reason for hurrying this particular matter.

The CHAIRMAN said the Committee were agreed that the Council had taken reasonable steps to oppose the Bill.

The Committee then adjourned until yesterday (Monday).

LEGAL INTELLIGENCE.

THE WELSBACH LITIGATION.

Last Saturday, sixty actions by the Welsbach Incandescent Gas-Light Company, Limited, to restrain infringement of their 1893 patent came before Mr. Justice Darling, in the King's Bench Division of the High Court of Justice, upon motion for judgment in default of defence and appearance. Mr. A. J. Walter attended on behalf of the plaintiff Company, and stated that none of the defendants had entered an appearance, and the pleadings had been duly filed at the proper office. The particulars alleged the breaches complained of, and the minutes were in the usual form. His Lordship entered judgment for the plaintiffs in all the actions.

DISPUTE AS TO A COAL CONTRACT.

At the Derbyshire Assizes last Friday, before Mr. Justice Bruce and a Special Jury, Mr. W. Spooner (Mayor of Chesterfield), trading as the New Riber Colliery Company, sued the Eveson Coal Company, Limited, of Birmingham, for £892 10s., for breach of contract on the purchase of coal. The particulars set out that by a contract contained in certain letters during 1900, the defendants agreed to purchase from the plaintiff 12,000 tons of the best New Riber gas coal at the price fixed therein, to be delivered to their order during the year ending July 1, 1901. Under this contract, plaintiff received orders from the defendants for 7300 tons of coal, and duly delivered it. He was always willing to deliver in accordance with the contract the remainder of the 12,000 tons; but he alleged that the defendants declined to send orders for any more than the 7300 tons. He claimed that he had had to sell some of the 4700 tons at a lower rate, and had 2623 tons left on his hands at a reduced value. Mr. Buszard, K.C., and Mr. Etherington Smith appeared for the plaintiff; Mr. Hugo Young, K.C., and Mr. M'Cardie represented the defendants.

In opening the case, Mr. Buszard explained the circumstances under which the New Riber pit came into the plaintiff's hands in 1894. Being informed that the coal was valuable for gas-making purposes, an analysis was made by Mr. Phillips, the official gas coal examiner to the Rotherham Corporation. In 1897, plaintiff sent a sample of 16 tons of this coal to Mr. A. Graham, Engineer and Manager of the Mansfield Gas Company, for analysis; and his report substantiated that of Mr. Phillips. Early in 1900, Mr. Cash, brother-in-law of Mr. Eveson, and a partner in the firm prior to its being converted into a limited company, examined plaintiff's coal, and expressed satisfaction with the quality; and subsequently plaintiff was asked to supply the defendants with particulars as to any contract he might be prepared to enter into with them. He replied that he would supply from 10,000 to 12,000 tons at 11s. 6d. per ton for screened, and at 10s. 6d. per ton for unscreened coal. At that time really first-class coal was selling at from 16s. to 19s. per ton. It was agreed that plaintiff should supply defendants with 12,000 tons of the coal. He delivered 7600 tons; and the defendants then refused to take any more.

Plaintiff gave evidence in support of the learned Counsel's opening statement, and was cross-examined by Mr. Young. Asked if his coal was not known as very inferior house coal, he said it was not house coal at all, but gas coal; and he sold it as fair gas coal for the price paid. When he wrote to defendants that he had sold 500 tons at 9d. per ton below their contracts, he acknowledged that it was "a little bit of bluff" on his part. Mr. C. Phillips was called, and stated that, judging from the sample sent to him, the coal was very suitable for making gas. Mr. J. Wheelhouse, Working Manager to the plaintiff, admitted that the coal was not of first-class quality. If it was described in the returns sent to the Mines Inspector as "Tryston three-quarter house coal," it was not true. The coal produced was not a fair sample of that sent to the defendants. Plaintiff (recalled) said the return alluded to had not been made out by his authority. This was the first time he had heard of it, and he presumed it was made out by the Mines Inspector whose name it bore. The sample of coal produced was a very fair sample of their slack. Mr. J. Muir, the London Manager to Messrs. J. M'Kelvie and Co., described the plaintiff's coal as "second-class gas coal." He said he purchased 5200 tons in 1898 at 5s. 3d. per ton, and it was most satisfactory. Later he bought 12,000 tons, and disposed of it to the Birmingham Corporation. The only complaint he had about the coal was that it was somewhat damp.

Addressing the Jury for the defendants, Mr. Young said the point for them to consider was whether or not the coal supplied was of the quality set out in Mr. Graham's analysis. They had tried to sell the coal in various parts of the country, but had failed in every place. They had many complaints as to the quality, because when it was received it was found to be nothing like up to the analysis. Although defendants took 250 tons before July with the view of placing contracts, they could not get a single one except with Birmingham and High Wycombe. The former took 7000 tons, the latter 250 tons; but they had many complaints. A contract for 4000 tons with Godalming was cancelled, or this would have practically exhausted the 12,000 tons agreed to be taken. Notice was given to the plaintiff at that time, and had been persisted in, that the defendants would not be responsible for the arrears, though he had all along attempted to force the coal upon them. If the coal had been up to the standard of the analysis, they would have had no difficulty in placing it.

For the defendants, Mr. A. G. Bates, Manager of the Wokingham Gas Company, was called. He said he had had some of the plaintiff's coal, and found it unfit for making gas, as it yielded only 7250 cubic feet per ton. He had never heard of the New Riber coal before, and did not want to hear of it again. Additional evidence having been given to the effect that the coal was inferior, Mr. Graham was called, and said he considered the sample of coal he tested satisfactory as a second-class gas coal. In 1900 he contracted with the plaintiff for 1000 tons, but it was not equal to the coal he had analyzed. He tried to use it for gas making; but, after having 400 tons, he found it useless for the purpose, and refused to take any more.

His Lordship having intimated that the question for the Jury was whether or not the coal supplied was in accordance with the written contract, Mr. Young said the terms of the contract were for "12,000 tons of best New Riber screened gas coal at 11s. 6d. per ton, and best unscreened coal at 10s. 6d. per ton." It was a question as to whether the defendants really got an article that could be so described. His Lordship then summed up; and the Jury, after a brief consultation, returned a verdict for the plaintiff—the question of damages to be submitted to an arbitrator.

HIGH COURT OF JUSTICE—CHANCERY DIVISION.

Wednesday, Feb. 26.

(*Before Mr. Justice* SWINFEN EADY.)

Sunderland and South Shields Water Company v. Pemberton.

This was a summons in regard to the construction of a point in a deed as to the meaning of the words "domestic and other purposes" in regard to water supply to a mansion-house.

Mr. VERNON SMITH, K.C., and Mr. MARTELLI appeared for the plaintiffs; Mr. EVE, K.C., and Mr. BOVILL represented defendants.

Mr. VERNON SMITH stated that his opponents contended that the words "domestic and other purposes" allowed the owner or occupier of a mansion-house where the trade of a laundry was carried on to use a very large quantity of water for that purpose. A special case had been agreed on, which stated that the Sunderland Water-Works Act of 1846 incorporated the plaintiff Company for the purpose of supplying the town of Sunderland with water; and by section 32 it was enacted that they should provide, and keep constantly laid on, a supply of pure and wholesome water amply sufficient for the domestic use of all the inhabitants who were entitled to demand it. Section 55 enacted that the Company should furnish the occupier of a private house at certain rates with a supply of water for domestic purposes, which should not include water for baths, horses or cattle, or for washing carriages, or for any trade or business; and section 62 provided that the Company should supply persons with water for "other than domestic purposes" and water-closets at agreed rates. The Act contained no express definition of "domestic purposes." By an indenture dated Feb. 16, 1852, and made between Mary D. Pemberton and others and the Company, certain pieces of land near Humbledon Hill, Bishopswearmouth, Durham, were conveyed to the Company in fee simple, for sinking wells, &c., one of the conditions being that the Company would for ever after maintain, at their own expense, and supply to the mansion-house of the estate, called Barnes, and to the two farmhouses called Quarry Hill Farm and Hill House Farm, a free supply of water "for domestic and other purposes." Since the date of the indenture, the Company had supplied water to these places free for all purposes, including a nursery garden, but for no trade or business. The defendant, R. L. Pemberton, who was a party to the deed of Feb. 16, 1852, had died since the action was commenced, and J. S. G. Pemberton had become the owner of the house and grounds; and in May, 1899, he sublet a portion of the outbuildings to Robert Kirkaldy, for the purposes of the business of a laundry. The lease was granted for three years, from May, 1899, at £50 per annum; and it was admitted that the free use of the Company's water was a factor in settling the amount of the rent. The water used for the laundry since the commencement of the lease to Dec. 19, 1901, was 1,042,050 gallons, which, at current rates, came to £67 10s. It had been agreed that if the defendant was not entitled to grant the use of the water to Kirkaldy for a laundry without payment, he should pay this sum to the Company, with the costs of all water supplied for any other than "domestic and other purposes," and should agree to an injunction to prevent further user of the water without charge. Counsel said the question turned upon the original Act and the conveyance following it. The only point was whether the words did or did not include the use of water for a laundry; and he should ask his Lordship to say they did not.

Mr. BOVILL submitted that "domestic and other purposes" meant domestic and every other purpose. In this case, there was a landowner selling something to the Company, and part of the consideration was that he should have free water to his mansion-house and to his two farms. He suggested that, in the conveyance, what the vendor wanted to have was water for every purpose, and the Company, knowing they had the power to supply water for "domestic and other purposes," did, in fact, incorporate these very words in the conveyance. Therefore, they meant domestic purposes for the mansion-house, and other purposes, such as for baths, horses and cattle, &c., or even for any trade or business.

Justice SWINFEN EADY: Do you mean that if the mansion-house was converted into a paper-mill the Company must supply free the water for paper making?

Mr. BOVILL said in the present case they had not converted the house; they were, in fact, using the stables as a laundry. What the Company had undertaken was a free supply of water to the house; and he asked his Lordship to say that a free supply for "domestic and other purposes" meant for every purpose.

Mr. EVE followed on the same side, and submitted that the construction of the Act was clear. There were two sorts of supply—one for "domestic purposes" and the other for "other than domestic purposes." The Act did not define what domestic purposes were, but what "other than domestic purposes" were; and the question was whether there was any limitation in the supply to be found in the contract. He said there was not. The bargain the landowner made was that he should be supplied with water for "domestic and other purposes," which embraced the two definitions, and which he no doubt thought he was entitled to in consideration for the land he was selling to the Company.

Justice SWINFEN EADY said the question was whether, under the true construction of the conveyance of Feb. 16, 1852, the defendants were entitled to a supply of water free of charge for the business and

trade of a laundry, which was being carried on in a portion of the outbuildings of the mansion-house in question. He was of opinion that the defendants were not so entitled. They were entitled to a free supply of water for "domestic and other purposes" to the premises as a mansion-house, and to the two farmhouses as such buildings. He thought the defendants were entitled under the conveyance to use the water for horses, cattle, washing carriages, &c., and for all purposes for which a mansion-house might be used; but, under cover of the provision "free of charge," the defendants had let off a portion of the place, and a laundry was being carried on there, not in connection with the mansion-house, but as an ordinary trade, and they asked for a free supply of water. In his opinion, this was not within the meaning of the Act. If they could carry on the business of a laundry, they could turn the building into a paper-mill, which required a large supply of water, and the farmhouses into buildings for other trades, and demand free water for all. In his judgment, the defendants were not entitled to use water for trade purposes without paying for it.

Mr. VERNON SMITH said there would be an order for payment by the defendants of the sum of £67 10s. and a subsequent amount due to date, and an injunction to restrain the defendants from using or allowing the water to be used for trade purposes without payment—costs to follow the event.

An order was made accordingly.

The Disclosure of Trade Secrets.

In the Court of Appeal yesterday, Mr. Lush moved on behalf of the plaintiff in the case of *Bray v. Milne* to amend the order, as drawn by the Associate, on the appeal heard a fortnight ago (*ante*. p. 423), by adding two or three words, to allow him to inspect not only machines and apparatus, but "plans and drawings" The Master of the Rolls said the Court certainly intended to embrace "plans and drawings" in the order made; and it should have been so drawn up. Mr. M'Call said, speaking from a note made at the time, "documents" were not mentioned at all, and plaintiff did not ask for inspection of any plans. He (Counsel) did not object to the amendment being made, provided that the words "if any" were added. The Master of the Rolls assented. Mr. M'Call said that the order as drawn up included not merely the manufacture of gas-burners but of gas lighting appliances; and as the defendants had very large works, they objected to the plaintiff being allowed to inspect all these appliances. Lord Justice Romer said what was meant was "appliances" for burners. After some discussion, it was arranged that the parties should try to agree upon a proper form of order; and, if necessary, the matter could be mentioned again.

Tampering with Prepayment Meters.

At the Clerkenwell Police Court on Friday, William Bland, 24, a labourer, of Swanley Street, Islington, was charged with attempting to steal from a prepayment gas-meter 2s. 4d., the money of the Gaslight and Coke Company. Last Tuesday night a lodger in the house was alarmed by an escape of gas. She ran downstairs, and saw the prisoner standing by the gas-meter. She asked what was the matter, and he replied, "Hold your noise. The gas is leaking. I'll soon stop it. Keep your tongue quiet, or you'll get me locked up." The lodger became alarmed, and called in a police officer. Bland left the house as the officer arrived. It was then discovered that the receptacle for money attached to the meter had been wrenched, and that the instrument used had penetrated the supply-pipe, thus causing the escape. The prisoner was arrested on Thursday, and in reply to the charge said, "I did not take the money." This statement was true. No money had been taken from the receptacle; but the meter had been damaged to the amount of £2. Bland told the Magistrate (Mr. D'Eyncourt) that his wife had left him, and, in a fit of temper, he smashed the meter. His Worship treated the charge as one of wilful damage, and ordered the prisoner to pay £4, or in default one month's imprisonment. At Greenwich Police Court last Saturday week, two men named Marmion and Beck were charged with being suspected persons, found on enclosed premises at 155, Killearn Road, Catford, and also with stealing 5s. 2d. from an automatic gas-meter at Brookdale Road, Catford, on Jan. 20, and 11d. from a meter at 148, Sandhurst Road. Detective-Sergeant Pike said he saw prisoners together, and followed them about a mile to Killearn Road. They then separated, and each walked up one side of the road. They came together again, and went into the garden of No. 155, an unoccupied house. They appeared to be doing something near the catch of the window. A gentleman came out of a house near, and they went away. On witness arresting them, he found on Beck a screw-driver and a table knife, and on Marmion a meat hook. Beck said they were going to get some coppers out of a gas-meter, as they were hard up. He said he had broken open about a dozen meters altogether, and Marmion had helped him with two. Mr. Maude, an inspector of the South Metropolitan Gas Company, said on Jan. 20 he called at 14, Brookdale Road, and found the meter broken into and 5s. 2d. missing. On Feb. 23 he called at 148, Sandhurst Road, and found the meter had been broken open and 11d. taken. Beck was committed for three months, and Marmion for one month.

Leeds Gas Workers' Grievances.—At a meeting of the Gas Committee of the Leeds Corporation last Wednesday, the Chairman stated that there was every reason to anticipate that a mutually satisfactory arrangement would shortly be arrived at between the Committee and the disaffected men at the gas-works.

Aberavon New Gas-Works.—The Aberavon Town Council, at a special sitting of the General Purposes Committee on Wednesday last, approved of the plans of Messrs. Thomas Newbigging and Son, of Manchester, for the proposed erection of new gas-works on the Victoria Road; and tenders are now being invited for the work. It is hoped that the new works will be ready in time for next winter's requirements. The present works are struggling for an existence; but it is satisfactory to note that, since the advent of Mr. A. Bond as Gas Manager, the sale of residuals has gone up 80 per cent.

MISCELLANEOUS NEWS.

PROVINCIAL GAS AND WATER COMPANIES.

We continue to-day our reports of the meetings of Gas and Water Companies in different parts of the kingdom.

GAS COMPANIES.

Cleethorpes.

At the recent half-yearly meeting of the Cleethorpes Gas Company, it was announced that there had been an increase of 5 million cubic feet in the make of gas in the six months ending Dec. 31, which amounted to 41½ million cubic feet. There were 350 new consumers, and 349 additional cooking-stoves fixed on hire; while the sale of gas fittings, fires, and other appliances, amounted to £501. In moving the adoption of the Directors' report, the Chairman (Mr. J. Robinson) stated that the profit on the half-year's working enabled them to pay an increased dividend, and carry forward a very substantial balance. The business of the Company continued to grow very rapidly, and this would necessitate some further manufacturing plant in the near future. A thorough investigation was being made into the subject of carburetted water gas; and if the Directors found this system could advantageously be adopted, they purposed having plant erected during the summer. Every effort was made to make gas popular with the customers, not only for lighting, but for heating, cooking, and other purposes. The Manager (Mr. E. J. Brockway) was authorized to fit up the public lamps in the district with incandescent lights, and the principal streets with double and triple lights, as soon as the work could be carried through. He was arranging a system for the inspection and maintenance of incandescent lights in consumers' houses, at a small inclusive charge per quarter. The report was adopted.

Cork.

The accounts presented at the ordinary general meeting of the Cork Gas Consumers' Company last Thursday showed that the gas-rental in the latter half of the past year amounted to £18,215, and that the total revenue was £28,036. The expenditure being £25,421, there was a balance of £2615 to go to the profit and loss account. The balance of this account was £1273; and the Directors recommended a dividend at the rate of 4 per cent. per annum. As this would amount to £2753, a sum of £1480 had to be taken from the reserve fund. The Chairman (Mr. G. Lynch), in moving the adoption of the report, said the Directors met the proprietors under more agreeable conditions than they did six months ago, when the strike was still unsettled. It was arranged about a month after the meeting, and he was glad to say that work had since been going on satisfactorily. It had always been the wish of the Directors to be the friends as well as the employers of their workmen; and if in future the men would meet them in the same spirit, and discuss reasonably any causes of complaint they might have, he had no doubt any little differences that might arise from time to time could be amicably arranged. The accounts now presented included thirteen out of the nineteen weeks that the strike lasted. As was to be expected from such an occurrence, the business was completely disorganized, and there was a serious falling off in the make and consumption of gas. It was fortunate that a considerable reserve fund had been set aside, as it enabled the Company to meet the extraordinary demand for the new gasholder, and supplement the reduced earnings so as to pay the dividend offered. He might add, however, that had it not been for the large expenses and losses caused by the strike, it would not have been necessary to draw upon the reserve for dividend. Mr. F. W. Mahony seconded the motion; and it was carried unanimously. The dividends recommended were declared, and the proceedings closed.

Cradley Heath.

The annual general meeting of the Cradley Heath Gas Company was held last week—Sir Benjamin Hingley presiding. The report stated that the profit for the year ended Dec. 31 amounted to £3117. This, added to the balance of £1754 brought forward, made a total of £4871 available for distribution. It was recommended that the usual dividends of 10 and 4 per cent. should be paid upon the various classes of capital, and that the balance of £1786 should be carried forward. There had been a steady increase in the sales of gas. A reduction in the price of coal enabled the charge for gas to be reduced 2d. per 1000 cubic feet from July 1 last. Attention was drawn to the large amount paid for rates and taxes. Not only had the assessment been considerably raised, but the rates had increased ever 100 per cent. during the last ten years. The report was adopted.

Douglas.

The half-yearly meeting of the Douglas Gas Company was held last week—Mr. Joseph Kaye, the Chairman, presiding. The Directors' report announced a profit of £4646 for the six months, which, added to the amount brought forward from the previous half year, made £8400 available. The Board recommended the payment of a dividend of £2 5s. per share, and the placing of £500 to reserve. The profit showed a slight increase on that for the corresponding half of the previous year, notwithstanding the decrease in the price of gas. The Chairman said that in all probability there would shortly be a further reduction in price. The report was adopted.

Eastbourne.

The proceedings at the half-yearly meeting of the Eastbourne Gas Company on Monday of last week were of a somewhat lively character, owing to a very lengthy criticism by one of the shareholders of some coal contracts entered into by the Board, and also regarding questions of management. The meeting, however, concluded with a vote of confidence in the Directors, which was passed *nem. con.* The report submitted recommended the payment of dividends for the half year at the rate of 14½ per cent. on the "A" and "C" shares and 11½ per cent. on the "B" shares, leaving an amount of £11,266 to be carried forward. There was an increase of about 9 per cent. in the sales of gas.

In moving the adoption of the report, the Chairman (Dr. G. A. Jeffery, J.P.) remarked that they had made an addition to their works in the shape of an oil-gas plant. The cost of the coal gas (£8905 for 126½ million cubic feet) was 16·92d. per 1000 feet; while that of the oil gas (£3822 for 51½ million cubic feet) was 17·18d. per 1000 feet. The return of the Manager (Mr. John Hammond) for sales of residuals amounted to £6776, or more than enough to pay the 14½ per cent. dividend, leaving the gas out of the question altogether. The report was adopted; and a special meeting was afterwards held to authorize the issue of debentures to the amount of £18,750.

Elland.

The annual meeting of the Elland-cum-Greetland Gas Company was held last Friday—the Rev. G. E. Aspinall (Chairman) presiding. The report stated that the profits amounted to £6339, which allowed of a dividend being paid on the ordinary capital at the rate of 13 per cent. for the year. At an extraordinary meeting held subsequently, the Directors were empowered to issue additional capital, in order to pay off the temporary loan occasioned by the recent extensions, and for the investment of the reserve and insurance funds rendered necessary by the provisions of the new Act.

Enfield.

The ordinary half-yearly meeting of the Enfield Gas Company took place on Thursday—Colonel Somerset, C.B., in the chair. In moving the adoption of the report and the declaration of a maximum dividend of 5 per cent. on the ordinary stock, he remarked that the consumption of gas had increased by no less than 10 per cent. in the past six months. The number of new consumers had augmented, and everything proved satisfactory. The motion was carried with unanimity. During the meeting, it was mentioned incidentally that further capital would be required to meet the needs of the Company, which, no doubt, the residents in the neighbourhood would be glad to tender for when the time arrived.

Harwich.

The Directors of the Harwich Gas Company, in their annual report, which was submitted to the shareholders at the meeting last Wednesday, stated that the high price of coal, which had averaged 18s. 9d. per ton for the year, had caused much difficulty; but it was not thought advisable to raise the price of gas. The profit, after making proper provision for maintenance and renewals, and writing down the cost of stoves and meters at the usual rates, amounted to £1085. The Directors recommended that £168 be taken from the reserve fund account, and that a dividend of 8½ per cent. on the original and 6 per cent. on the additional shares be paid. The new retort-stack, and other alterations and improvements in the retort-house, had involved an expenditure of £1630, one-third only of which had been charged to capital account.

Hertford.

At the ordinary general meeting of the Hertford Gas Company on the 20th ult., the amount available for distribution allowed of the payment of dividends of 5½, 8½, and 7½ per cent. on the three classes of shares, less income-tax. The Directors reported that the average cost per ton of coal during the past year had been high, due to the still excessive prices ruling; while the amount realized for coke had fallen. Against these disadvantages, however, there had been a satisfactory gain in an increased output of gas. The Chairman (Mr. E. Manser), in moving the adoption of the report, remarked that the net cost of coal had been £390 more during 1901 than in 1900, and £784 more than the previous year; making a total increase in two years of £1174. Bearing this in mind, he did not think the shareholders would consider the balance-sheet was otherwise than satisfactory. The reason they had been able to keep in such a good position was because of a very considerable development of business; 3 million cubic feet more gas having been manufactured during the past year. A large number of extra meters had been fixed, 53 of which were slot meters; while the quantity of gas used for cooking had enabled them to get on as well as they had done. The report was adopted, and the Secretary and Manager (Mr. R. Watson) thanked for the energy and ability he had shown in the work he had done for the Company. In acknowledging the compliment, Mr. Watson, referring to some remarks which had been made on the subject of the competition between gas and the electric light, said he had the curiosity recently to go through a list of places published in an electrical paper where the light had been introduced; and he found that for a series of years the output of gas in those very places had increased. This was highly satisfactory, and a good augury of what might happen at Hertford. The cost of the electric light could only be known after it had been in use for some months, and it would be found that it had a very powerful rival, both in efficiency and cheapness, in incandescent gas-burners.

Matlock and District.

It was stated in the annual report of the Matlock and District Gas Company that the profit for the past year amounted to £2393, which, with the unappropriated balance from the previous year, made a total of £4229. Against this had been charged the interim dividend paid in August, amounting to £1003, and £182 for debenture interest, which left for disposal at the present time £3039. This the Directors recommended should be applied in paying the statutory dividends of 5 and 3½ per cent., which would absorb £1008, and leave £2031 to be carried forward. There was a satisfactory increase in the business of the Company during the year, chiefly owing to the increased number of gas-engines erected in the district.

Redcar and Saltburn.

The report of the Directors of the Redcar and Saltburn Gas Company for the year ending Dec. 31 showed that the sum available for division, after payment of the interim dividend in August, was £2421; and they recommended a dividend of 5 per cent. on the original shares (making 9 per cent. for the year) and of 3½ per cent. on the ordinary "B" and "C" shares (making £6 6s. per cent. for the year), free of income-tax, which would leave a balance of £161 to be carried forward. The Directors advertised for fresh loans, with the result that they received £5060, leaving a balance of £4940 required to make up the loan capital of £10,000 which they were authorized to borrow. Owing to the rapid development of the business, the Directors recommended the issue of 500 £10 shares, ranking for a maximum dividend of 10 per cent. per annum, at a premium of £5 per share. The number of consumers in 1891 was 800, and in 1901 3300.

Rugby.

The report submitted to the shareholders at the annual meeting of the Rugby Gas Company showed the receipts during 1901 to have been £19,269, and the expenditure £14,703—leaving a balance of £4565. The Directors recommended a dividend for the half year on the paid-up share capital of the Company at the rate of 13 per cent. per annum, amounting to £2197. Owing to the increased demand for gas, the Board found it needful to make additions to the manufacturing plant, and to lay additional mains; and they proposed to call up at an early date the balance on the partly-paid shares. The report was adopted, and the dividend declared.

Salisbury.

At the recent half-yearly meeting of the Salisbury Gas Company, the Chairman (Mr. G. Fulford), in moving the adoption of the accounts for the six months ended Dec. 31, 1901, and the payment of the usual dividends, ranging from 5 to 10 per cent. per annum on the various classes of shares, said the business of the Company showed a sound and satisfactory progress, and the demand for gas for illuminating, heating, and cooking was well kept up. The care and maintenance of the Welsbach incandescent burner by the Company's workmen at a moderate fixed charge had proved satisfactory. Mr. W. Young seconded the motion, and it was carried unanimously. The thanks of the shareholders having been given to the Chairman, Directors, and officers, for their services, the Manager (Mr. Norton H. Humphrys) replied on behalf of himself and the staff.

South Shields.

The report presented at the annual meeting of the South Shields Gas Company last Friday stated that the revenue account showed a balance to profit of £11,371. There had been a net increase in the gas-rental of £3281; and other increases were as follows: On rental of meters, apparatus, &c., £524; and on sulphate of ammonia, £628. On the other hand, coals had cost £3791 more, and wages £2012 in excess of the previous year. Owing to the reduction in the price of coke, there was a decrease of £2937 in the receipts. During the year 2630 prepayment meters had been fixed, and they had yielded a net sum of £1115. Part of the new retort-house was now in use, so that greater economy in the manufacture of gas might be looked for. In December last, £8000 of new stock, sold by public auction, realized £13,383, or an average of £167 5s. 1d. per £100. An extraordinary meeting would be held at the close of the ordinary meeting, to sanction the sale of £41,990 of new stock and the issue of £14,228 mortgage bonds, in such sums as might be required from time to time, for the extension of the works, plant, and mains. The Directors regretted that the profit had not been more satisfactory. They, however, anticipated better results during the current year. They recommended a dividend of 3½ per cent. for the half year, which, with the interim dividend paid in September last, made 7 per cent. for the year; but, in order to pay this, it would be necessary to draw on the Company's accumulated funds, leaving ¾ per cent. standing over as an arrear. On the motion of the Chairman (Dr. J. F. Armstrong) the report was adopted.

Swindon.

The half-yearly meeting of the New Swindon Gas Company—the last before the amalgamation of the Company with the Swindon Gas and Coke Company, Limited, under the style of the Swindon United Gas Company—took place on Saturday, when the Chairman (Mr. W. H. Ludgate) had a most satisfactory report to present. The sales of gas for the half year amounted to 48 million cubic feet—an increase of 8 millions; while for the twelve months they had been 83 millions, or 13½ millions more than previously. As indicative of the popularity of slot meters, he mentioned that these accounted for 30 million cubic feet. The income from all sources for the half year was £12,300; and the expenditure £9900—leaving a net profit of £2400. This enabled the Directors, after carrying forward £400, to recommend dividends of 4 per cent. on the debentures, 4½ per cent. on the preference stock, and 5 per cent. on the consolidated ordinary stock. During the past year, more than 800 houses had been fitted up, and the number of consumers had been increased to 4200. There had been 850 new cookers supplied—the total in use being 3000. The report was adopted.

Walker and Wallsend Union.

The annual meeting of the Walker and Wallsend Union Gas Company was held last Wednesday—Mr. T. Crawford presiding. In moving the adoption of the report, the Chairman said that the sum of £12,203 had been spent on capital account during the year. The total capital expenditure to Dec. 31 last was equal to £411 per million cubic feet of gas made. Notwithstanding the high price of coal, the revenue account had been most satisfactory, owing principally to the favourable sale of their residual products. The price of gas was reduced on April 1 by 4d. per 1000 cubic feet, less 5 per cent. discount to small consumers, and an increased graduated scale of discounts to large consumers. The gas sold (203,116,239 cubic feet) showed an increase of 9·37 per cent. The revenue account was the most satisfactory in every respect in the history of the Company. The principal works at Willington Quay were in a high state of efficiency, and the alterations in the carbonizing, &c., plant there had been attended with most beneficial results. Notwithstanding the large output of electricity for motive power and lighting, the increase in the use of gas for heating and lighting continued as in the past, prior to the introduction of electricity. This was doubtless accounted for by the increase of population and the improvement effected in gas appliances. The Directors were glad to be able to present the very favourable statements and balance-sheet which had been issued. The dividend now proposed of £4 12s. 6d. per cent., was at the rate of £9 5s. per cent. per annum, and was the maximum that could be paid according to the scale—leaving a balance of undivided profits of £3481 to be carried forward. This result had been obtained after writing off a liberal amount for old material replaced by new, and putting £1500 to the reserve fund. It would be seen from the first statement of the

electricity undertaking to Dec. 31 last, that the capital expenditure had been £84,725; and that the shares issued amounted to £69,330 fully paid, leaving a balance unissued of £18,670. Instead of carrying the premiums to a reserve fund and afterwards dividing the amount of preliminary expenses over a series of years, they would find that the premiums had been carried direct to revenue account, which account showed a credit balance of £2570 carried forward. Now that the output of electricity at Neptune Bank station had considerably increased, the cost of production per unit had been reduced fully one-half; and this was gradually going on as the output increased. Mr. G. A. Allan seconded the motion, which was carried unanimously. An extraordinary meeting of the Company was then held, at which it was agreed to raise additional capital.

Waltham Abbey and Cheshunt.

The accounts of the Waltham Abbey and Cheshunt Gas Company for the past half year show a balance to the credit of profit and loss account amounting to £2520, out of which the Directors, in their report, recommended dividends at the rate of 8 per cent. per annum on the original or "A" shares and 6 per cent. on the "B" and "C" shares, leaving £940 to be carried forward. The sale of gas increased in a satisfactory manner; but the low prices obtainable for residuals influenced the revenue unfavourably. The total receipts were £5831, and the expenditure £4225, which left a balance of £1606 to be carried to profit and loss account. In the manufacture of 25,880,000 cubic feet of gas, 2149 tons of coal and 12,082 gallons of oil were used.

Wellingborough.

It was stated in the report of the Wellingborough Gas Company that the quantity of gas sold during the past six months was about 16½ per cent. greater than in the corresponding half of 1900, and that the number of meters in use had been increased by 624. The Directors recommended that a dividend of 6 per cent. on the "A" and "B" shares and 4½ per cent. on the "C" shares, free of income-tax, be declared for the half year. The receipts for the six months amounted to £12,051, while the expenditure was £9526, leaving a balance of £2425 to be carried to profit and loss account. The quantity of coal carbonized during the half year was 6113 tons; the amount of gas sold being 64,724,475 cubic feet.

Wellington.

Special interest was attached to the recent annual meeting of the Wellington Coal and Gas Company from the fact that it was the jubilee meeting. In the course of the address delivered by the Chairman (Mr. Harry Shepard), he gave an account of the progress made by the Company during the fifty years of its existence. He stated that in the month of December, 1851, the consumption of gas in the district amounted to 540,000 cubic feet; whereas in the month of December, 1901, the gas consumed totalled 5,243,000 cubic feet. A good number of gas-engines (from 1 to 12 horse power) were in use in the town, and these had played an important part in the consumption of an increased quantity of gas. Slot-meters had also become very popular, and were greatly appreciated, especially by the working classes. The Company had no fewer than 550 of such meters—chiefly penny-in-the-slot; and a large number of small grillers, supplied free of rent, had also been issued. Last year the Company paid 18s. per ton for coal, compared with 11s. 6d. per ton in 1899. The Chairman produced a business card issued by the Company in 1851, showing that the price of household coal at that time supplied by the Company was 9s. 2d. per ton for the best quality, and the prices ranged from that sum to as low as 6s. 8d per ton. Votes of thanks were passed to Mr. Shepard for presiding, and to the officers of the Company.

Weymouth.

The report presented at the half-yearly meeting of the Weymouth Consumers' Gas Company on the 20th ult., stated that the past six months had been more propitious than the immediately preceding periods; coal having been much easier in price. Considerable benefit had also been experienced from the improved form of retort-setting now in use; for while a smaller amount of coal had been carbonized, an increased quantity of gas had been produced. Coke, however, had not been quite so profitable. The output had been larger; but the price realized was not so good. Compared with the corresponding half of the previous year, the amount of gas sold showed an increase of 9·9 per cent.; the increase over the whole year being at the rate of 9·5 per cent. It had been necessary to provide a heavy sum from revenue in connection with the reconstruction and renewal of the buildings and plant at the works. The gas-making portion had now been completed; and the Directors had just entered into a contract for the renewal of the sulphate of ammonia plant. The result of the six months working had been the production of a profit in excess of that of recent half years. The balance of profit, after paying interest on the debenture stock and providing for the maximum dividend on the ordinary stock, had been carried to the credit of the net revenue account, to reinstate the amount by which that account was depleted during the two preceding half years to make up the dividend paid for these periods. The Directors recommended the declaration of a dividend for the six months at the rate of 5 per cent. per annum, less income-tax, on the ordinary stock. The receipts amounted to £10,336, and the expenditure to £7674, leaving a balance of £2562 to be carried to the net revenue account.

Wolverhampton.

The report which was adopted at the meeting of the Wolverhampton Gas Company last week stated that in the past six months there had been a net profit made of £8737. This, added to the balance from the previous half year, enabled the Directors to recommend the payment of dividends of 3 per cent. upon the preference stock, 5 per cent upon the consolidated stock, and 3 per cent. upon the new ordinary stock, less income-tax. They further recommended that £146 be placed to the credit of the reserve fund (interest for the half year), and likewise £40 to the credit of the insurance fund, and that the balance be carried forward to next account. The report was adopted. The Chairman (Mr. C. C. Smith) afterwards mentioned that in 1890 it was decided to raise £30,000 by the issue of new ordinary stock. Stock to the amount of £12,300 had been sold; and it was now intended to offer a portion of the balance, in order to push forward the slot-meter and gas-cooking portion of the business.

WATER COMPANIES.

East Worcestershire.

The report placed before the shareholders at the half-yearly meeting of the East Worcestershire Water-Works Company last Thursday stated that the profits for the six months amounted to £3003, as against £1976 in the previous half year. The balance brought forward from last account increased the disposable sum to £3863, of which it was proposed to appropriate £1331 to pay a dividend for the half year at the rate of 4 per cent. per annum, free of income-tax, and to carry forward the balance of £2532. The Chairman (Mr. C. P. Noel), in moving the adoption of the report and statement of accounts, said that, taking everything into consideration, it was a satisfactory report. As they were all aware, the Company were at the present moment in a certain amount of trouble owing to the fact that opposition was being offered to the Bill which they had brought before Parliament for the extension of their works to Studley and Alcester, and other parts, and also for sanction for necessary works already completed. The decision to carry forward a balance of £2532 had been arrived at because the Company had been put to a good deal of expense with respect to new pumping works, &c., and had had to ask the Bank of England for temporary advances. They would be able to pay off a certain amount, if not the whole, of that money without much loss, in a year or a year-and-a-half. They might, he added, in the future have to spend more money in increasing their mains; but this, of course, meant adding to their receipts, and, he hoped, their dividends. Mr. A. Williams asked if it would not be possible to make some concession to the opposers of the Bill with a view to securing the withdrawal of their opposition. The Secretary (Mr. P. W. Walker) said he did not think the Company could come to terms. He said that eight or nine years ago the Company were approached by the North Bromsgrove District Council—not the Bromsgrove District Council, but their predecessors—to give them a supply at Catshill, inasmuch as the village was dependent for its water supply on wells, a good many of which were contaminated. The Directors agreed to furnish the supply on the terms laid down in the Water-Works Clauses Act, at the rate of 10 per cent. on the outlay for mains, taking no account of the pumping machinery or other charges. This offer was declined at the time; but the Company, pursuing the policy they had laid down for themselves—namely, to meet the requirements of the whole district—ultimately selected a site for a pumping-station near Catshill, put down pumps, and laid the mains. They had, however, only received about nineteen applications for a supply of water. The Company had been approached to give a supply to Bourne Heath, and had stated that they were prepared to do so on the terms laid down by law. But this had been declined, though it was a very reasonable offer. A statement was made to the effect that many of the people who had wells went to the river at Catshill and took buckets of water for their own use. The report was approved.

Luton.

At the 66th half-yearly meeting of the Luton Water Company on Thursday, the Directors' report showed that the balance on the net revenue account was £2899. Out of this, they proposed to pay the maximum dividend of 4 per cent. on the consolidated stock. It was stated that the reserve fund now stood at £8152, which was for the time being the maximum amount. The Directors were thus in a position to allow a rebate of 7½ per cent. to all consumers for the current half year. The Engineer (Mr. W. R. Phillips) reported that the engines, mains, &c., were all in good order. The Chairman (Mr. R. S. Tomson) said everything showed that the proprietors had a very sound and progressive property. As the limit of the reserve fund had been reached, they would make a rebate of 7½ per cent. to consumers, representing £750 a year. The report was adopted unanimously and the dividend declared. The Directors' remuneration was advanced from £120 to £300 per annum, as from the beginning of the year.

Newcastle and Gateshead.

The annual meeting of the Newcastle and Gateshead Water Company was held last Tuesday, under the presidency of Mr. W. D. Cruddas. The Chairman, in moving the adoption of the report, said the increase of revenue had come fully up to expectations. The sum of £9260 represented the growth for the year in the revenue of the Company; and it was interesting to bear in mind that of this sum about £3000 had come from domestic rental. This increase was owing to the growth of Newcastle and its suburbs. The remaining £6000 odd was accounted for by the fact that the drought compelled many users of water to come to the Company for supplies, their own sources having failed. This large meter-return had enabled them to meet the very great cost of pumping at Wylam, which during the year was £3553. The Directors recommended a dividend at the same rate as in the previous year—namely, 9 per cent. per annum for the past six months, which, with the interim dividend, was equal to 8½ per cent. for the year. They proposed to carry forward £6558. It would be seen that the Company had paid the interest and dividend upon a considerably increased capital; and yet they had been able to maintain the previous rate, which was perhaps more than everyone expected at one time. With regard to expenditure, the Chairman referred to the great outlay at Catcleugh. The progress made, he said, was very satisfactory. Though last year was a bad year for water, it was a good one for work; and full advantage had been taken of the latter fact. As a result of the different improvements, there would be a great increase in the local storage of water. The new reservoirs would not only make this possible, but they would also indirectly increase the conveying capacity of the pipes, inasmuch as water could be brought in during the night to the extent of several million gallons. This could not previously be done. The Benwell pumping-station had been increased to give a better supply to the higher districts and to increase the pressure in the mains. The report was adopted.

Newmarket.

The annual meeting of the Newmarket Water-Works Company was held last Monday week—Mr. B. Chennell presiding. The report

of the Directors stated that the progress of the Company continued to be satisfactory; a number of additional services having been laid on. The profits of the Company for the past year, including the balance brought forward from the previous accounts, amounted to £3091. The Directors recommended that a dividend of 10 per cent. on the old capital and 7 per cent. on the new capital be declared, and £500 written off the works and plant account, and £30 off the meters account for depreciation. The report and accounts were adopted.

South Staffordshire.

In moving the adoption of the report at the half-yearly meeting of the South Staffordshire Water-Works Company last Thursday, the Chairman (Mr. Frank James) said that the Directors had again to tell the old story of the increased number of houses which had been laid on with a supply of water. These amounted during the half year to 2257, making the total number of houses supplied 112,784. If they had been in the unfortunate condition of some of the North country people last autumn, there would have been loud outcries in South Staffordshire; but the money they expended had turned to good account, and they had been able to continue a good supply during the whole of that period. The result was that there was a revenue of £58,292 from water-rates, as against £55,437 on the corresponding period of the previous year. On the revenue account, there was a diminution from £11,913 to £8919 in engine charges. This was due partly to the collapse of the coal bubble, and the lower prices of coal, but also to the less consumption of that fuel, notwithstanding that they had pumped 97 million gallons more water than in the corresponding half year. Although the decrease in price had been considerable, the reduction in the consumption of coal had been equal to 2300 tons. This had been due primarily to the improved condition of the machinery, the renewal of the engines at Lichfield, and the laying down of larger mains from Fradley to Burton-on-Trent. In maintenance of works, there was a reduction from £5453 to to £4900. The total amount of the charges on the profit and loss account was £27,795, as against £30,117. The Directors had transferred £1000 to the depreciation fund, thus raising it to £14,863; and after providing for interest on debenture and preference stock, the amount for division (including £6294 brought from last half year) was £24,612. The consumption of water per head was very much larger than a few years ago. The motion was unanimously adopted. A resolution was also passed declaring a dividend for the six months on the ordinary stock at the rate of 6 per cent.

Trowbridge.

At the recent meeting of the Trowbridge Water Company, the accounts presented allowed of the payment of a dividend on the consolidated stock and upon the amount paid on the new shares, for the year, and upon the fourth call for the nine months ending, Dec. 31, 1901, at the rate of 4 per cent. per annum. This left a balance of £57 to go forward. The Chairman (Colonel R. T. Caldwell) called attention to the fact that the final payment of the sum agreed consequent upon the defalcations of the late Secretary, had been brought into the account, and therefore this transaction had been entirely finished off. Testimony was borne to the valuable services rendered to the Company by the Manager (Mr. W. W. Gray) and the local Manager (Mr. Knowles).

West Cheshire.

At the annual meeting of the West Cheshire Water Company, dividends at the rate of 5 per cent. per annum were declared on the ordinary and preference shares. The adoption of the report and accounts was moved by the Chairman (Mr. John Holt), who, in the course of his remarks, said the shareholders could congratulate themselves on a satisfactory year's working. In the face of a largely increased capital, and working expenses seriously affected during the first nine months of the year by the high price of fuel, the Directors were able to recommend the maintenance of the dividends at the same rate as for the last five years. The Board were gratified to be able to state that the result of a year's working by the new plant at the Hooton pumping-station had been most satisfactory. The engines and pumps had answered all expectations; and the level of water in the boreholes was, up to the present, practically unaffected by the pumping. The development of the Company's district continued steadily; the number of new customers for domestic and trade purposes being above the average. The report and accounts were unanimously adopted.

West Surrey.

The income of the West Surrey Water Company for the past half year was £5710, and the expenditure £2134; being an increase of £414 and £16 respectively as compared with the corresponding half of 1900. The amount available for distribution was £4438; and at the meeting of the Company last Tuesday, maximum dividends were declared upon the ordinary 7 per cent. shares, and at the rate of 7½ per cent. per annum upon the 10 per cent. shares. The Engineer and Manager (Mr. John K. Hill) reported that the whole of the works were in good order. Contracts have been entered into for laying a second main, 15 inches in diameter, from the pumping-station to join the existing main from the reservoir at St. George's Hill; and others will also shortly be arranged for the construction of subsidence reservoirs and other works at Walton-on-Thames.

Economy of Incandescent Gas Lighting.—Mr. J. H. Troughton, of Newmarket, has lately been giving the inhabitants of the town further examples of the economy to be realized by the adoption of incandescent gas lighting. At St. Mary's Church, incandescent lights have been substituted for the old flat-flame burners. In the December quarter of 1899, the gas bill, with the old burners, was £6 2s. 3d.; in 1900 it was £7 6s. 9d.; and last year, when incandescent burners had only been in use two months, it was £2 4s. 2d. If the incandescent burners had been in use for the whole three months, it would have been considerably under £2. It was stated that the church authorities obtained a very much better light than they had ever had before. At the Conservative Club, he has lighted the billiard tables at a cost of ½d. per table per hour, with burners put into inverted globes, so that it will be impossible to damage them with a billiard cue.

CROYDON COMMERCIAL GAS AND COKE COMPANY.

The Ordinary Half-Yearly General Meeting of this Company was held last Friday, at the Small Public Hall, George Street, Croydon—Mr. CHARLES HUSSEY, J.P., in the chair.

The SECRETARY (Mr. William W. Topley) read the notice convening the meeting and the minutes of the last ordinary and extraordinary meetings; and the report and accounts (which have already been noticed in the "JOURNAL") were taken as read.

The CHAIRMAN—after referring to the death of one of the Directors (Mr. J. A. Lambert), and the appointment of the late Secretary (Mr. W. J. Russell) in his room, to the selection of Mr. W. W. Topley to succeed Mr. Russell, and to the promotion of Mr. J. W. Helps to the position of Engineer and General Manager of the Company—alluded to the past half-year's business of the Company. He thought that the increase of 26,616,000 cubic feet in the quantity of gas sold (representing 7·31 per cent. increase) must be considered highly satisfactory. Of course, they must not overlook the fact that they had the electric light to compete with. During the six months 805 additional accounts had been opened, making the total number of consumers 17,487; and this rate of increase had been well maintained in the two months that had already expired of the present half year. Then 356 additional gas-stoves had been let on hire, making a total of 8880. The reports of the examiner on the illuminating power and purity of the gas had been of the most satisfactory character throughout the period under review. The receipts on capital account up to Midsummer last were £394,031. They had spent during the half year to December £6125—on new buildings £1076, and on new mains £2640. The latter amount was rather large; but they had some complaints from the districts of Wallington and Carshalton of the very low pressure; and they had laid bigger mains, with satisfactory results. On additional meters they had spent £764, on new stoves £978, and on new house-fittings £664; making a total expenditure on capital account of £419,313. Coming to the revenue account, the receipts for gas amounted to £57,437—£44,225 in the Croydon district, £6110 in the Carshalton district, and £7101 for public lighting and contracts. There was thus an increase in Croydon of £3764, in Carshalton of £955, and in public lighting of £355—or a total increase of £5074. He thought this was highly satisfactory. Rental of meters showed an increase of £163, rental of gas-stoves of £281, and rental of house-fittings of £92—or a total of £536—over the corresponding half of 1900. Coke had realized £11,077, breeze £731, tar £1595, and sulphate of ammonia £1809. Every one of these items, with the exception of sulphate (and that arose from a greater quantity having been sold) showed a decrease. For coke they had received £4105 less than they did in the corresponding period of 1900. They had sold 310 tons more; but the price realized was 3 82d. per cwt., or 26 per cent., less. Breeze realized £79 less, and tar £385 less. So that practically everything they had gained by the fall in the price of coal had been nullified by the bad returns from residuals. They were, however, not alone in this respect. During the years 1898 to 1900 when residuals were steadily rising, the Company were gaining by the increased value of coke (which is sold at the market price from day to day), while receiving coal under contracts made earlier on a lower basis. The extra profit reaped by the Company in this way culminated in the half year ended June, 1900, when the balance available for division exceeded the amount required for dividends by £9466. This amount, and more, the Company practically gave to the consumers during the following year—namely, that ended June 30, 1901—by the very small advance made in the price of gas. In that year, while the expen iture on coal and oil was £31,593 more than the year before, the receipts from the sale of gas and residuals showed an increase of only £13,407; the two thus placed side by side amounting to a loss of profit to the Company of £18,186. This course of action necessitated drawing the sum of £5556 from the reserve fund. The Company had now just turned the corner. During last half year the dividend had been earned with a balance to the good of £110; and the Directors had continued their policy of a generous treatment of the consumers, and would reduce the price of gas, as from Lady-day, to its former level—from 2s. 10d. to 2s. 8d. per 1000 cubic feet. The Directors would always sell their gas at the lowest price possible, for they recognized that it was necessary to make it as popular a light as they could. The total expenditure was £59,566, or £6591 less than in the corresponding period. This enabled them to carry to net revenue account a balance of £17,598. After paying all fixed charges, there was left a sum of £16,460 available for division. Arrangements had been made to offer for sale by auction at the Mart £10,000 of consolidated "C" ordinary stock. The present was not the best of times for such a sale; but they must have money to enable them to keep pace with the growing demands upon them. They contemplated putting up a new retort-house, with improved machinery; and they were also improving the machinery in another retort house, besides other matters. He concluded by moving the adoption of the report and accounts.

Mr. THOMAS RIGBY seconded the motion.

Mr. WARD asked what amount the 2d. reduction in the price of gas would represent. The Company were issuing new capital on which they would have to pay dividends; and last year they had to draw on the reserve fund, while on the present occasion they only just earned enough to pay the dividends. He thought therefore the proposed reduction was a very plucky step.

The CHAIRMAN replied that 2d. per 1000 cubic feet represented about £6000 per annum. They hoped to have a very good year, because they were now carbonizing coal at the lower price at which it was obtainable, having used up the expensive stock purchased at high prices.

Several shareholders expressed the opinion that it would have been better to make a call on the "Carshalton capital" than sell more new "C" stock by auction.

The CHAIRMAN said it was not very long since a call was made; but they must bear in mind the fact that on the "Carshalton capital" they had to pay 9 per cent. The matter should, however, have the careful attention of the Board when the Company were in a more flourishing

condition than at present. The 2d. reduction in the price of gas would, of course, apply to Carshalton as well as to Croydon. The Directors had sent out circulars to the consumers, who might wish to invest small sums in the new capital.

The resolution was then carried unanimously.

Mr. CORBET WOODALL proposed that dividends for the half year be declared at the rates of 14 per cent. per annum on the consolidated "A" ordinary stock, 11 per cent. on the "B" stock, 9 per cent. on the "C" stock, and 9 per cent. on the "Carsharlton capital"—all free of income-tax. He said that a year ago, when he moved a similar resolution, the earnings fell short of the amount required for the dividends by £7120. In the past half year, however, they had just made good this deficiency. It should be remembered that out of the £5000 of additional revenue which they had received during the half year, £3000 was due to the increased price of gas which they were now about to take off. And in facing the current half year and the future, with the price brought back to the lowest rate they had ever charged for gas, they were quite conscious of the fact that they would lose this additional revenue. They were heartily glad that the increase—small as it was—was now a thing of the past; and he trusted that they had begun again the right progression with regard to the price of gas—which was progression downwards. A shareholder had characterized the Board as plucky in adopting the course they had; but he would very much rather they were called plucky than cowardly, and in this matter the Directors at any rate had no fear of the result. The difference in the accounts for this time last year and for the past six months was made up as follows: There was a net saving on the cost of materials of £2500—that was to say, they had saved £7500 on the cost of coal and oil, and lost about £5000 on the residuals. In addition to this, they had £5000 extra revenue, which made a gain of £7500; and this was almost exactly the difference in the net receipts for the two half years. On the whole, he thought there could be no room for any shadow of doubt that the position of the Company was a very satisfactory one.

Dr. THOMPSON seconded the motion, which was agreed to.

Mr. H. D. ELLIS said he should like to join with Mr. Corbet Woodall in his remarks. As a shareholder he entirely approved of the policy of the Board. It was not only a plucky policy, but it was a statesmanlike policy; and he had no doubt the future would justify it. They had had an increased gas consumption during the past half year of no less than 7·31 per cent.; and they had every reason to expect similar increases in the future.

The retiring Directors (Messrs. Thomas Rigby and Corbet Woodall) were re-elected on the proposition of Mr. SAMUEL SPENCER and Mr. WILLIAM CASH respectively; and, on the motion of Dr. THOMPSON, the retiring Auditor (Mr. J. C. Benwell) was also re-appointed.

The CHAIRMAN next proposed, and Dr. THOMPSON seconded, a resolution granting to Mr. Russell a retiring allowance of £350 a year. The latter stated that in regard to the amount he considered the Company had made a very good bargain for themselves.

Mr. CORBET WOODALL said he did not like the suggestion of a bargain having been struck with Mr. Russell. What really weighed with the Directors was this: Mr. Russell was a comparatively young man; and they trusted that, now he was relieved of the cares of office, his life would be long preserved to serve them in his new capacity. But it was one thing to grant a retiring allowance to a gentleman who, after forty years' service, had reached sixty or seventy years of age, and quite another to give the same allowance to a gentleman of Mr. Russell's age. It was put to Mr. Russell whether he would prefer to take a smaller amount now, with a longer pe iod in front of him, rather than wait a further number of years and take his chance of getting a larger allowance over a shorter number of years.

The resolution having been heartily agreed to,

Mr. RUSSELL thanked the Directors and the shareholders for their kindness, and said he was only sorry that his health had broken down. He hoped, however, to be of assistance to the Directors in his new position. During the long time he had had the pleasure of serving the Company, he had always done his very best; and he greatly felt the honour conferred upon him by electing him to a seat on the Board. He wished to take the opportunity of thanking the staff for the uniform courtesy and many kindnesses he had received from them; and more especially did he appreciate the testimonial—a solid silver salver—which they had presented to him. With regard to Mr. Topley, he could only speak of this gentleman in the highest terms; and he felt confident he would carry out his duties to the satisfaction of everyone.

Resolutions were afterwards passed fixing Mr. Topley's salary and thanking the Chairman and Directors and the staff for their attention to the Company's interests.

Acknowledgments by the CHAIRMAN, Mr. HELPS, and Mr. TOPLEY brought the proceeding to a close.

BRISTOL GAS COMPANY.

The Half-Yearly Meeting of this Company was held last Thursday, at the Offices, Canons' Marsh—Mr. J. W. S. DIX in the chair.

The accounts presented showed that in the six months ending Dec. 31 the sale of gas produced a revenue of £116,104, compared with £107,962 in the corresponding period of 1900; residuals yielded £41,585, against £50,925; and the total receipts were £162,248, compared with £162,797. As to expenditure, the manufacturing charges came to £113,259, compared with £124,232 in the latter half of 1900—coal and oil costing £79,903, against £91,248 twelve months ago. The total expenses were £139,517, against £144,092. The balance carried to the profit and loss account was £22,731, compared with £18,705. The amount available for distribution was £21,480; and the Directors recommended a dividend at the rate of 5 per cent. per annum. They stated in their report that the make of gas in the latter half of 1901 had been 7·44 per cent. in excess of that of the corresponding half of the previous year, and that there had been a considerable increase in the use of gas cooking-stoves. They added that a very complete installation of inclined retorts had been erected at the Avon Street works of the Company.

The CHAIRMAN, in moving the adoption of the report and accounts, said that, as the Company would be celebrating their jubilee next year, he did not propose to go into details so fully as he might otherwise have done. The report alluded to the increase in the make of gas of 7·44 per cent.; and he would like to supplement this statement by a few comparisons between the figures of last year and those of ten years ago. In 1891 the expended capital amounted to £801,819, and now it had increased to £1,126,478; while their income had risen from £261,000 to £329,392. The reserve fund, which had recently been slightly touched, had grown from £44,357 to £104,064 in the same period. Anyone present who lived in the city of Bristol must know that the taxes had increased; and he was sorry to say that, in his opinion, they had not reached the end of it. In 1861, the Company paid £788 in rates; in 1891, £6959; and at the present time, £8923. The last-mentioned sum he thought the proprietors would regard as a substantial contribution to the rates of the city. The consumption of coal had increased with the greater output of gas; for the figures in 1891 were 170,161 tons, and 230,120 tons in 1901. The gas made in the former year amounted to 1572 million cubic feet, and in the latter to 2202 millions. So far as the price was concerned, it was 2s. 8d. per 1000 cubic feet ten years ago, and now it was 2s. 3d.—that was to say, 2s. 3d. to the general consumer and 2s. 1d. to consumers of more than a million, who represented 25 per cent. of the output. He believed the progress of the Company was likely to go on. In 1891, they had 275 miles of mains; and this number had extended to 333 miles. With regard to prepayment meters, there had been a marvellous change. In 1891, they had the small number of 14, while now they had 5578 in use; cookers had increased from 1890 to 16,467; and street-lamps from 6469 to 8708. The public required more light, and more light the Company intended to give them. He was glad to be able to state that the Corporation, notwithstanding the fact that the electric light supply was in their own hands, had determined to introduce incandescent gas-lamps into certain thoroughfares. This showed that they appreciated the light of gas and the price they had to pay for it; and he had no doubt that it was a great deal better for them. In 1900. there was a rise in the price of coal, amounting to 7s. 6d. per ton, which meant an additional expenditure of nearly £80,000 a year. Yet, in spite of this, they had been able to pay their dividend without raising the price of gas—a feat which few companies besides themselves had been able to accomplish. He was glad to say that the last contracts were signed at a reduced figure, and the next lots were expected to show a further reduction. This, he thought, would enable them to reinstate the reserve fund; and, speaking entirely for himself, he hoped before long they would be able to reduce the price of gas to something like 2s. He then proceeded to refer to the absence of the price of the Company's shares from the lists of the Bristol Stock Exchange, and after dealing with the whole of the circumstances, said the Directors were accused of having raised unfair competition with the stockbrokers. He did not know where this accusation came in, but it looked very much like Trade Unionism. The Directors had done what they had a perfect right to do, and they had never put themselves into competition with the brokers. The action of the Stock Exchange had not affected the value of the Company's stock, and had, in fact, been as ineffectual as the recent strike of the tramway employees.

Rev. P. R. SLEEMAN seconded the motion.

The CHAIRMAN, before putting the resolution, described municipal trading, as carried on in some places, as unfair competition. However, notwithstanding the advantage the Corporation had in their electric lighting concern, by having the use of the ratepayers' money, the Company were flourishing, and no one was at present in a sounder condition than they were.

The motion was carried, as was one declaring a dividend of 5 per cent. upon the nominal ordinary capital of the Company.

BARNET DISTRICT GAS AND WATER COMPANY.

The Half-Yearly Ordinary General Meeting of this Company was held on Friday last, at the Albion Tavern, Aldersgate Street, E.C.—Mr. CHARLES HORSLEY, J.P., in the chair.

The SECRETARY (Mr. Ernest W. Drew) read the notice convening the meeting; and the report of the Directors was taken as read.

The CHAIRMAN, in moving the adoption of the report and accounts, said that in the six months under review they had lost a little of the public lighting, owing to the lamps now being lighted by electricity; but the private lighting was better, and altogether there had been an increase in the quantity of gas sold, as compared with the corresponding period of the previous year. In consequence of the reduced price of coal, the charge for gas had been lowered from 4s. 2d. to 4s. per 1000 cubic feet. There had been an increase in the receipts from water during the past half year of £769. The total profits for the six months amounted to £10,305, which, after deducting interest on mortgage bonds, &c. (£1613), left a net profit of £8692. Out of this the Directors recommended dividends which would absorb £7232, and leave a sum of £1460 to be added to the net available balance. The profits were sufficient to pay a somewhat higher rate of dividend than that recommended; but, as the balance had been depleted to a considerable extent during the past two or three years, the Directors thought it more to the general interest of the Company to deal with the half-year's surplus profit in the manner indicated. The supply of water from the Company's existing wells had been ample to meet the requirements of the district; and the yield of water at the East Barnet well was highly satisfactory. The Engineer (Mr. T. H. Martin) reported that the works generally were in a good state of repair. Mr. James Glaisher had, he regretted to say, retired altogether from the Board. He became a Director as long ago as 1872; and he (the Chairman) joined the Board with him. His son, Dr. Glaisher, said he was as well as could be expected under the circumstances, for of course he had reached a very great age. The vacancy on the Board had been filled up by the election of Mr. A. F. Phillips, who was a good water

engineer, and would look after this part of the business. He might say that during the past year they had not worked their pumping engines overtime at all, which showed that they were getting a better supply of water. The well at East Barnet they considered very satisfactory indeed. They could pump 1½ million gallons a day from it without keeping the water down. The coal carbonized during the half year amounted to 4650 tons, as against 4740 tons in the corresponding six months of 1900—or a decrease of 90 tons. The average price paid for the coal was 19s. 8d. per ton, as against 22s. 2d.—being a decrease of 2s. 6d. per ton. The gas made per ton of coal amounted to 10,996 cubic feet, as compared with 10,971 feet. The total quantity made was 51,130,000 cubic feet, as against 52,003,000 feet, or a decrease of 873,000 feet; but the amount sold was 45,646,100, as compared with 45,460,000, or an increase of 186,100 feet. The gas sold per ton was 9816 cubic feet, as against 9591 feet; and the proportion unaccounted for was 9·23 per cent., as compared with 11·08 per cent. They made 4429 chaldrons of coke, as against 4514 chaldrons, and sold 3248 chaldrons, as compared with 3155 chaldrons. The average price realized for the coke was 11s. per chaldron, instead of 13s. 6d. The make of tar was 51,153 gallons, or 11 gallons per ton of coal carbonized; and the average price obtained for it was 1⅜d. per gallon, as compared with 1½d. Of sulphate, they had turned out 46 tons, as against 44 tons; the make per 100 tons of coal being 1 ton, as against 18½ cwt. They had realized for the sulphate of ammonia an average price of £6 0s. 9d. per ton, as compared with £6 15s. The receipts from gas (at 4s. per 1000 cubic feet) amounted to £9308; while in the corresponding period of the previous year the price charged was 4s. 2d., and the sum received was £9636. There was thus a decrease of £328 under this head. Then the returns from residuals showed a decrease of £472, so that the total receipts from the gas portion of the business were less by £800 than in the corresponding period. As to the expenditure, it would be seen that the amount paid for coal (£4581, against £5253) had decreased by £672; while working expenses (£4414, against £3930) had increased by £484. There was therefore a decrease on this side of the account of £188. The profits on the gas-works (£3053, against £3665) had decreased by £612; while the water operations had resulted in additional receipts of £769—the figures being £12,587, as compared with £11,818. Then the expenditure had decreased from £7065 to £5449; so that the total profit on the water-works (£7138, against £4753) was greater by £2385 than in the last six months of 1900. The total profit of the Company, less interest on loans and income-tax, was £8692, as against £6926, or an increase of £1766; and as the amount required to pay 7 per cent. was £7232, there was, as he had already said, £1460 to be carried forward, as contrasted with a deficiency of £1166 the previous year. They could thus clearly have paid a higher dividend on the present occasion.

Mr. A. H. BAYNES seconded the motion; and it was unanimously carried.

On the proposition of the CHAIRMAN, seconded by Mr. BAYNES, the following dividends, less income-tax, were then declared for the half year: At the rate of 7 per cent. per annum on the "A" and "C" stocks, 6 per cent. on the "B" stock, and £4 18s. per cent. on the "D" capital gas and water stocks and shares.

The retiring Directors (Messrs. Charles Horsley and I. A. Crookenden) and Auditor (Mr. F. Lennard) having been re-elected,

The CHAIRMAN proposed a vote of thanks to the Engineer, who he said had over 100 miles of water-mains to look after, besides the gas-works.

Mr. A. F. PHILLIPS, in seconding, remarked that he had just been over the district, and was exceedingly pleased with the works—especially the new pumping-station at East Barnet. He believed this pumping-station would turn out to be most useful to the Company, and that it would get them out of the difficulties they had experienced from the deficiency of water.

Mr. MARTIN briefly returned thanks, as did also Mr. DREW and Mr. WRIGHT (the Cashier) for similar compliments paid to them.

Extraordinary Meeting.

An Extraordinary Meeting was afterwards held for the purpose of authorizing the Directors to issue additional capital.

The CHAIRMAN moved that the Company should raise, by the creation and issue of new ordinary shares of £10 each or stock, a sum not exceeding in the whole £40,000 of "D" water capital, as authorized by the Barnet District Gas and Water Act of 1887. He remarked that they already owed some money, which this additional capital would enable them to pay.

Mr. BAYNES seconded the resolution; pointing out that their capital account was already £28,000 on the wrong side, so that it was absolutely necessary to raise the money to complete work already in hand—the reservoir and pumping machinery at Potter's Bar.

Mr. DYER asked whether the £40,000 would be allotted *pro ratâ* to the shareholders. If he read the Act rightly, the gas stock had to be sold; but the water stock could be allotted to existing holders at par. He believed they were the last water company to obtain this power. He also asked whether the Directors could not see their way to substitute debenture stock for the mortgage bonds which it was proposed to issue.

The CHAIRMAN, in reply, said the shares would be offered *pro ratâ* to existing holders at par; but he could not, without first obtaining legal advice, say anything with regard to substituting debentures for the mortgage bonds.

The resolution was then carried unanimously, as also was one authorizing the borrowing on mortgage of the undertaking of £2500 in respect of each £10,000 of "D" water capital of the Company.

Mr. J. L. CHAPMAN proposed a vote of thanks to the Directors, who, he said, were a little "pulled over the coals" at the last meeting because they had reduced the dividend; but the wisdom of the step was obvious. He hoped they would go on consolidating the Company. A 7 per cent. dividend was one they should all be satisfied with, as they had a good undertaking behind them.

An acknowledgment of the vote by the Chairman concluded the proceedings.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 541.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
590,000	10	Oct. 11	10½	Alliance & Dublin 10 p.c.	18—19	..	5 10 6
100,000	10	,,	7½	Do. 7 p.c.	13—14	..	5 7 2
300,000	100	Jan. 2	5	Australian 5 p.c. Deb. .	100—102	..	4 18 0
200,000	5	Nov. 13	6¼	Bombay, Ltd. . . .	6¼—6⅝	..	4 16 4
40,000	5	,,	6½	Do. New, £4 paid	4¾—4⅞	..	5 9 5
380,000	Stk.	Feb. 13	12	Brentford Consolidated	260—263	..	4 10 7
270,000	,,	,,	9	Do. New . . .	187—192	..	4 13 9
50,000	,,	,,	5	Do. 5 p.c. Pref. .	128—133	..	3 15 2
206,250	,,	Dec. 13	4	Do. 4 p.c. Deb. .	112—115	..	3 9 7
220,000	Stk.	Sept. 12	10	Brighton & Hove Orig.	210—215	..	4 13 0
246,320	,,	,,	7	Do. A. Ord. Stk. .	150—155	..	4 10 4
420,000	20	Sept. 27	10	British.	41—42	..	4 15 3
50,000	10	Feb. 13	12	Bromley, Ord. 10 p.c. .	23—25	..	4 16 0
82,850	10	,,	9	Do. 7 p.c. .	18—20	..	4 10 0
500,000	10	Oct. 11	6	Buenos Ayres (New) Ltd.	10—10½	+¼	5 14 3
220,000	Stk.	Dec. 30	4	Do. 4 p.c. Deb.	94—97	..	4 2 6
150,000	20	July 17	8½	Cagliari, Ltd. . . .	22—24	..	6 17 6
100,000	10	Sept. 27	10	Cape Town & Dis., Ltd.	15—16	..	6 5 0
50,000	50	Nov. 2	6	Do. 6 p.c. 1st Mort.	52—54	..	5 11 1
550,000	Stk.	Oct. 11	12	Commercial Old Stock	268—273	+3	4 7 11
236,425	,,	,,	9	Do. New do. .	205—210	+2	4 5 9
238,237	,,	Dec. 13	4½	Do. 4½ p.c. Deb.	130—135	..	3 6 8
800,000	Stk.	,,	9	Continental Union, Ltd.	162—167	..	5 7 9
200,000	,,	,,	7	Do. 7 p.c. Pref.	160—165	..	4 4 10
575,000	Stk.	Feb. 27	5	Crystal Palace Ord. 5 p.c.	120—125*	..	4 0 0
60,000	,,	,,	5	Do. 5 p.c. Pref.	122—127*	+1½	3 18 9
486,090	10	Jan. 30	10½	European, Ltd. . . .	18¼—19½	..	5 7 8
354,060	10	,,	10½	Do. £7 10s. paid	13⅝—14½	..	5 8 8
15,243,200	Stk.	Feb. 13	4⅞	Gas- { 4 p.c. Ord. . .	90—91	−1½	4 15 8
2,600,000	,,	,,	3½	light { 3½ p.c. max. .	89—91	..	3 16 11
3,799,735	,,	,,	4	and { 4 p.c. Con. Pref.	110—113	..	3 10 10
4,193,975	,,	Dec. 13	3	Coke { 3 p.c. Con. Deb.	92—94	..	3 3 10
70,000	10	Nov. 13	8	Hongkong & China, Ltd.	13—14	..	5 14 4
3,800,000	Stk.	Nov. 13	10	Imperial Continental .	208—211	−2	4 14 9
473,600	Stk.	Feb. 13	3½	Do. 3½ p.c. Deb. Red.	99—101	..	3 9 4
561,000	Stk.	Feb. 27	10	Liverpool United A .	227—229*	..	4 7 4
718,100	,,	,,	7	Do. do. B .	167—170*	..	4 2 4
306,083	,,	Dec. 30	4	Do. do. Deb. Stk.	118—120	..	3 6 8
75,000	5	Dec. 13	4	Malta & Medn., Ltd. .	4¼—5	..	4 0 0
560,000	100	Oct. 1	5	Met. of { 5 p.c. Deb.	107—111	..	4 10 1
250,000	100	,,	4½	Melbourne { 4½ p.c. Deb.	103—105	..	4 5 9
541,920	20	Nov. 13	3½	Monte Video, Ltd. . .	9—10	..	7 0 0
1,595,892	Stk.	Feb. 21	4½	Newc'tle & G'tesh'd Con.	10 —107	..	4 1 9
346,855	Stk.	Dec. 27	3½	Do. 3½ p.c. Deb.	98—100	..	3 10 0
150,000	5	Nov. 28	8	Oriental, Ltd. . . .	7⅛—8	..	5 0 0
135,000	4½	,,	8	Do.	6¾—7¼	..	4 19 4
15,000	1	,,	8	Do.	12—13	..	4 11 5
60,000	5	Sept. 27	7	Ottoman, Ltd. . . .	6—6⅝	+⅛	5 7 8

* Ex. div.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
851,070	10	Oct. 11	7	River Plate Ord. . .	10¼—10⅜	..	6 10 3
250,000	Stk.	Dec. 30	4	Do. 4 p.c. Deb..	95—98	..	4 1 8
250,000	10	Sept. 27	8	San Paulo, Ltd.. . .	12—13	+½	6 3 1
135,000	Stk.	Sept. 12	10	Sheffield A	244—246	..	4 1 4
209,984	,,	,,	10	Do. B	243—245	..	4 1 8
523,498	,,	,,	10	Do. C	242—244	..	4 2 0
5,850,000	Stk.	Feb. 13	5	South Met., 4 p.c. Ord.	123—126	..	3 19 4
1,627,965	,,	Jan. 16	3	Do. 3 p.c. Deb. . .	92—94	..	3 3 10
380,940	Stk.	Nov. 13	5	Southampton Ord. . .	104—108	..	4 12 7
70,825	,,	Jan. 16	4	Do. 4 p.c. Deb.	100—102	..	3 17 8
120,000	Stk.	Feb. 27	5½	Tottenham and Edmonton { A. 5 p.c.	120—125*	+2½	4 8 0
260,520	,,	,,	4	{ B. 3½ p.c.	93—98*	..	4 1 8
182,380	10	Jan. 16	5	Tuscan, Ltd.. . . .	7—8	..	6 5 0
149,900	10	Jan. 2	5	Do. 5 p.c. Deb. Red.	97—100	..	5 0 0
230,000	5	Aug. 15	9	West Ham, 10 p.c. . .	9⅝—10⅛	..	4 5 9
172,000	10	,,	6	Do. 7 p.c. . .	12⅝—13⅛	..	4 8 11
140,900	Stk.	Dec. 30	4	Do. 4 p.c. Deb.	105—110	..	3 12 9
				WATER COMPANIES.			
780,599	Stk.	Dec. 30	11⅛	Chelsea, Ord. . .	305—315	−10	3 13 0
150,000	,,	,,	5	Do. 5 p.c. Pref. .	155—160	..	3 2 6
160,000	,,	,,	4½	Do. 4½ p.c. Pref. '75	140—145	..	3 2 1
175,785	,,	Sept. 27	4½	Do. 4½ p.c. Deb. .	142—147	..	3 1 3
1,720,560	Stk.	Oct. 11	7	East London, Ord.. .	195—205	−5	3 8 4
654,740	,,	Dec. 13	4½	Do. 4½ p.c. Deb. .	143—148	..	3 0 10
1,018,046	,,	,,	3	Do. 3 p.c. Deb. .	97—99	..	3 0 7
700,000	50	Dec. 13	8	Grand Junction { 10 p.c. max..	112—117	..	3 8 5
310,000	Stk.	Sept. 27	4	{ 4 p.c. Deb..	127—132	..	3 0 7
708,000	Stk.	Feb. 13	16	Kent	300—310	..	5 3 3
160,000	,,	,,	7	Do. New, 7 p.c. max..	200—210	..	3 6 8
1,043,800	100	Dec. 30	10½	Lambeth, 10 p.c. max..	285—295	−15½	3 11 2
406,200	100	,,	8	Do. 7½ p.c. max..	210—220	−5	3 12 9
350,000	Stk.	Sept. 27	4	Do. 4 p.c. Deb..	125—130	..	3 1 7
500,000	100	Feb. 13	12⅛	New River, New Shares	405—415	..	3 1 8
1,000,000	Stk.	Jan. 30	4	Do. 4 p.c. Deb..	127—130	..	3 1 7
902,300	Stk.	Dec. 13	7	South-wark and Vauxhall { Ord. . . .	190—200	−10	3 10 0
126,500	100	,,	7	{ 7½ p.c. max.	180—190	−10	3 13 8
489,200	Stk.	,,	5	{ 5 p.c. Pref. .	155—160	..	3 2 6
1,019,585	,,	Oct. 11	4	{ 4 p.c. A Deb.	125—130	..	3 1 7
1,155,066	Stk.	Dec. 13	10	West Middlesex. . .	285—295	−10	3 7 9
200,000	,,	,,	4½	Do. 4½ p.c. Deb. .	140—145	..	3 2 1
200,000	,,	Sept 12	3	Do. 3 p.c. Deb. .	96—98	..	3 1 3

* Ex. div.

GAS POISONING CASES.

A sad accident occurred last Tuesday to George Wilson, a gas-fitter in the employ of the Lincoln Gas Committee. He was sent that morning, with a labourer, to connect the gas supply to a new fountain and lamp at Bracebridge. The gas-main passes beneath the structure; and having removed the manhole cover, Wilson descended into the chamber beneath the fountain for the purpose of tapping the main. On the drill penetrating the main, the gas escaped in such volume as to upset the man; and he came out into the fresh air to recover. Unfortunately, he appears to have left the hole uncovered; and when he descended into the chamber a second time, the gas had still greater effect on him. His mate saw him making an attempt to get out of the manhole, and went to his assistance; but Wilson then collapsed. The fumes also affected the labourer. Eventually both men were got away from the chamber by passers-by, and medical assistance was summoned; but Wilson was found to be dead. The labourer was too dazed to be able to fully describe what had happened; and he was removed to the County Hospital. Wilson had been in the employ of the Corporation for about twenty years, and leaves a widow and a large family. At the inquest which was subsequently held, Mr. John Carter, the Manager of the gas-works, said deceased's character was beyond reproach. He knew his trade, and was intelligent. He did all the important work of the Gas Department requiring special care and attention. Asked by the foreman of the Jury whether he thought, if there had only been coal gas in the chamber there would have been the same danger, Mr. Carter said this was a difficult question to answer. Personally, he did not think, whether it was coal gas or mixed gas, it would have made any difference. Deceased had never complained that the new gas was more difficult to manage, in making joints, than the old; but he noticed that it affected him sooner. Dr. Charles Harrison said the cause of death was asphyxiation by gas. In reply to a question by the Coroner, he said water gas itself was without odour; but this was carburetted water gas, and the carburetting process supplied its lighting properties and gave it a strong smell. In reply to a question, Mr. Carter said that during the four hours preceding the accident the quantity of gas passed into the holder serving the town was 191,800 cubic feet, of which 62,800 cubic feet were water gas. The limit at Lincoln was 33·33 per cent. The Coroner remarked that Wilson had evidently met his death owing to too great a reliance on his own skill and physical powers. The Jury returned a verdict of "Accidental death." At Redditch, a youth named Harvey Dolphin, who was helping to lay some gas-mains in Lodge Road, was rendered insensible through inhaling the gas; and he was removed to his home in an unconscious condition. Only after two hours' unceasing efforts did he partially recover.

The Cannock and Hednesford Gas Company have placed an order with Messrs. R. Dempster and Sons, Limited, of Elland, for new purifiers on Green's system.

ELECTRIC LIGHTING NOTES.

A Venture at Dover.

Last Tuesday, the Dover Corporation decided to purchase the electric light undertaking for £142,228—an increase of £13,000 on the sum they previously agreed to offer. The price accepted is based on the payment of £8 10s., for each £5 ordinary share.

Penzance in Doubt.

Penzance is still possessed of a wholesome dread of the risks of embarking in an electric lighting scheme. At a special meeting last Tuesday, the Town Council discussed the question as one of urgency; for it was pointed out that the Corporation's Provisional Order will expire in May, so that there is little time to take action, if anything is really meant to be done. Two schemes have, it seems, been under consideration—one involving an expenditure of £28,650, and the other of £22,840. It was suggested that an alternative course was open, and that instead of generating current themselves, the Corporation might buy it from the Cornwall Electric Power Company, who are promoting a Bill by which they seek authority to supply electricity throughout Cornwall. Alderman Bazeley, the Chairman of the Electric Lighting Committee, held out the flattering hope of electricity being obtained from the Company at ¾d. per unit. With this tempting prospect, the Council decided to defer further action in regard to their own scheme until they see the result of the Company's application to Parliament.

Electric Light Dethroned at Newmarket.

In the course of his remarks at the recent annual meeting of the Newmarket Gas Company, the Chairman (Mr. R. Stephenson, J.P.), referring to the large sale of gas which the Company had had—the largest, in fact, ever known in the town—reminded the shareholders that on the previous occasion he ventured to express an opinion that some of their old customers who had gone in for the electric light would be coming back to them, and they found this was the case. Several persons who were using the new light were now burning quite a large quantity of gas—in many cases nearly as much as they used before they had the electric light. They were told about two years ago, with something like a flourish of trumpets, that the Conservative Working Men's Club in the town had given peremptory orders to have the incandescent gas fittings taken out; and since then they had put in the electric light. After using it for nearly two years, they had reconsidered the whole question, with the result that the Club had given further orders to take out the electric light fittings and reinstate incandescent gas. This afforded the best of evidence that the Company were serving the town extremely well. The Club found that the gas recently put in was costing less than half what they were paying for electric light, and they got a far better light—in fact, if anything, they said that they had rather too much, and that it would have to be reduced to some extent.

Electric Lighting in Walker and Newcastle.

The fourteenth general meeting of the Newcastle-upon-Tyne Electric Supply Company, Limited, was held last Thursday. The Chairman

JOSEPH AIRD
GREAT-BRIDGE,
STAFFORDSHIRE.
TUBES
AND FITTINGS
GAS, STEAM, WATER GALVANIZED-TUBES, &c.
LONDON OFFICES: 46, QUEEN VICTORIA STREET, E.C.

(Mr. J. T. Merz), in moving the adoption of the report and balance-sheet, stated that, in addition to the 1,405,604 units distributed in the area of the Company, there had been sold to the Walker and Wallsend Union Gas Company, Limited, 1,156,779 units; the total units produced for consumption being 2,562,383. The cost per unit distributed was 1·9d., against 2·3d. per unit the previous year; the price received being 3·82d., compared with 4·09d. The cost of producing the current sold to the Gas Company was 0·7d. per unit. This was all produced at the central station at Wallsend. The Company had now 1673 consumers; being 513 more than at the end of the previous year—the total representing 112,000 8-candle lamps, or 40,000 more on the year. The gross revenue of the Company was £4180 more than before, to which had to be added £6514 received for the current sold to the Gas Company. The Chairman announced that in future the revenue from the Company would be added to that received by distribution. He added that since the end of the year the central station at Wallsend had been connected with all the sub-stations in the Newcastle and Gosforth area; and in consequence the cost had been reduced by nearly ½d. per unit—the weekly output of the central station being at present nearly 100,000 units. The report was adopted.

Bedford to Economize.

With the advent of Mr. Phillips, the new Electrical Engineer to the Bedford Corporation, a fresh effort is to be made to put the installation on a paying basis. A special report on the works (upon which the Council have now spent about £100,000) was presented at the meeting last Wednesday week. The Deputy-Mayor, in moving its adoption, stated that there was considerable over-capitalization for present needs. An expenditure of £3844 was recommended; but the Committee hoped, after this year, to effect economies amounting to £750. With regard to shops closing at 7.30, there was a loss of about £2600. The best profit was from public-houses and clubs. With regard to places of worship, the cost of supply was £203, and the revenue only £81, as the light was used for a very short period. Private consumers showed a cost of £2014 and a revenue of £2577. The Committee decided that they must encourage private consumers as much as possible; and he suggested they might consider free-wiring. Alderman Walker thought that the matter should be discussed at a special meeting. Some of them might feel disposed to sell the whole show, or let it to a company for a certain number of years. Mr. Baxter said it was suggested in Committee that if this proposal was carried out, the Council would have to write off about £40,000, which would be a very serious thing.

Gas Shareholders and Municipal Electrical Installations.

A question of interest to gas shareholders who are members of municipal corporations has been raised at Barnstaple. It has been ruled there, as in other towns, that shareholders in the local Gas Company are ineligible to vote as members of the Town Council on questions affecting the municipal electricity scheme. Now, however, that the scheme is well under weigh, and the contracts let, it is proposed to constitute the whole Council as the Electric Lighting Committee. This naturally raises anew the question of whether those members who have shares in the Gas Company will be eligible to vote; and, if not, what is the use of electing them to positions which carry no responsibility. The Town Clerk appears to have preferred to let the answer stand over until the situation actually arises, though there can only be one reply to it. If the question before the Committee is one which in some remote way affects the pecuniary interests of a member as a shareholder in the Gas Company, he cannot, as the law now stands, vote upon it. In such circumstances, a gas shareholder is an anomalous position as a member of a municipal electric lighting committee. It is an absurd disability in the large number of cases in which a man's interests as a ratepayer and a user of gas or electric light far outweigh any advantage which he derived from his investment in gas shares. A similar anomaly exists in the case of railway shareholders, who are prohibited from exercising magisterial jurisdiction in licensing cases, because railway companies own licenses and sell drink at refreshment rooms. The Government propose to remove this disability; and perhaps some day someone will discover the absurdity of the restrictions placed upon gas shareholders in town councils, and see that they also are afforded relief.

Profits not to Relieve Rates at Huddersfield.

The minutes presented by the Electricity Committee of the Huddersfield Corporation at the last monthly meeting showed that they were the possessors of a balance of £2561 of income over expenditure, and they had resolved to transfer it to the depreciation and contingencies account, to meet future outlay. Alderman Calvert having moved the adoption of the minutes, Mr. Barras congratulated him on having such a balance to dispose of, but said he would have been pleased if a portion could have gone to the sinking fund and a portion to the revenue. He considered that the Committee were under an obligation to the ratepayers to the tune of about £6000, and he thought that a small portion of the year's balance should be transferred to them. Accordingly, he moved that the matter be referred back to the Committee, with the view of £1000 being given to the ratepayers. Mr. Holroyd said the matter was taken thoroughly into consideration, and seeing that the Corporation had a large capital at stake, the Committee thought it advisable to have a reserve fund of £10,000 before anything was applied to the rates. He did not doubt for a moment that in a few years, if they were successful, they would be able to repay some of the interest, if members would only be patient and let them work their own way. The Committee thought that they had got the undertaking on thoroughly commercial lines, and it would, in his opinion, be a mistake at present to appropriate any of the money for the relief of the rates. Mr. A. Sykes supported the amendment, and thought that if the Committee appropriated £1500, it would form a handsome nucleus for a reserve fund. Mr. Chatterton remarked that, with an expenditure of £150,000 on the undertaking, there was sure to be considerable waste; and it would be much better to build up a reserve fund of £10,000 than to fritter the money away by helping the rates. He strongly hoped that the Council would support the Committee. The amendment was lost, and the minutes were passed.

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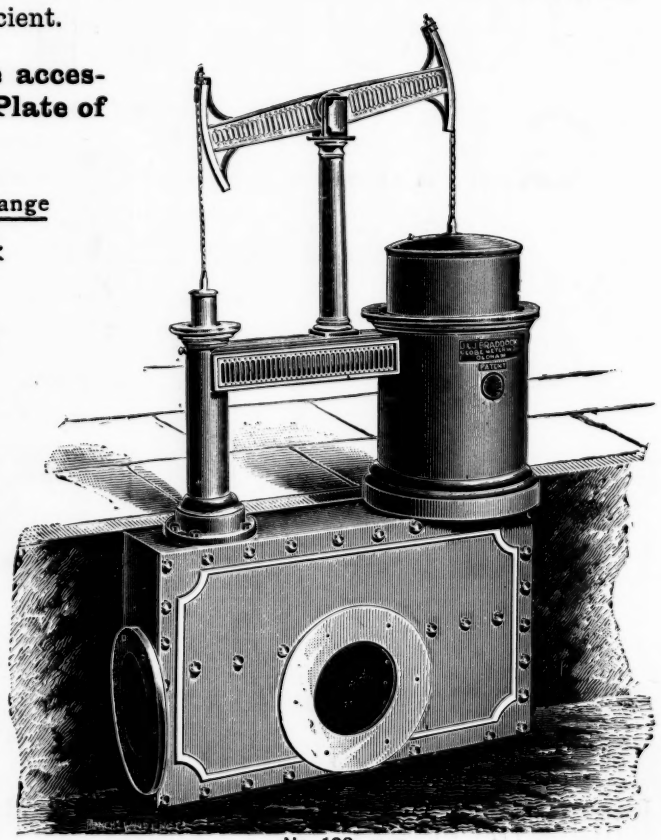

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THE LONDON WATER QUESTION.

The County Council and the Financial Provisions of the Water Bill.

At the Meeting of the London County Council last Tuesday, the Finance Committee presented a report on the financial provisions of the Government Water Bill, and the report of the Comptroller (Mr. H. E. Haward) thereon. In the course thereof, they stated as follows: "The Bill provides that the consideration for the transfer of these undertakings is to take the form of an amount of water stock bearing interest at 3 per cent., which is to be created by the Water Board. It is pointed out by the Comptroller that in July last, before the recent speculative rise in the prices of the Companies' stock, the ordinary stock of such a Company as the West Middlesex, whose dividend of 10 per cent. is fixed and comparatively secure, yielded to the investor a return of $3\frac{3}{4}$ per cent., the price of the stock being about 265. On this basis, the income of the Company would be worth $26\frac{2}{3}$ years' purchase. If the Company are to receive their income in 3 per cent. water stock, and the market value of such stock is assumed at par, they would receive $33\frac{1}{3}$ years' purchase of their income, or an increase in purchase price of 25 per cent. Adopting this percentage as the measure of the difference between the two proposals, and allowing something for the cost of re-investment in the case of payment in cash, the capital value of the gain to the shareholders, if they receive their incomes in the new water stock, cannot be estimated at less than £5,000,000. We do not think that the raising of the large sum of money which would be required to pay in cash those shareholders who were not disposed to accept stock presents any insuperable difficulties. We doubt if the proposed Board could raise the money on as advantageous terms as the Council; but, if it is to be raised by means of a separate water stock, such a stock should be made as attractive as possible to the investing public. We observe that the Bill does not contain specific provisions as to the redemption of the stock, but that this important matter is left to be settled by regulations made by the Local Government Board. It would be in the interests of the ratepayers that they should have a power of redemption, with proper notice, after a reasonable period, in accordance with the modern practice as regards municipal stocks. As to the proposed method of dealing with the irredeemable debenture stocks, there is no doubt that, in obtaining their interest in new water stock, the holders of these securities will secure an appreciable advantage in the better and more marketable security; and, until the conditions attaching to the new stock are laid down, we cannot say whether the existing holders give anything to the public in return. We think it important that this Council should, having regard to its special knowledge of the subject, have a *locus standi* in any arbitration between the Board and the Companies as to purchase, and should, moreover, have the right to claim arbitration in the event of a proposed agreement between the Board and the Companies."

Attention was called by Mr. Peel, M.P., to several points in the report. With respect to the proposed method of dealing with the irredeemable debenture stocks, he said the Committee were unable to say whether the existing holders gave anything to the public in return. He thought the debenture holders were giving a good deal, for, under the proposals of the Bill, their stock might be redeemed within 18 years, and therefore they would have to give up an irredeemable security. Lord Welby (the Chairman of the Committee) said the financial proposals of the Bill were of a somewhat indefinite character, the language of the Bill being vague. It was therefore possible for different persons to put varying constructions upon it; and for this reason the Committee wished to have the doubtful points settled. Mr. Beachcroft said he thought the Council would act far more wisely if, instead of issuing numberless documents dealing with this question, they tried to secure *locus standi* before the Committee who would consider the Bill, so that the constitution of the Water Authority might be argued upon. A good deal of printed matter had lately been issued on this subject. Most of it was not worth the paper used for it; and he thought it was time a protest was lodged against such expenditure of the ratepayers' money. Mr. M'Kinnon Wood contended that the information contained in the documents referred to was worth several millions to the people of London. Colonel Rotton desired to know by whose authority it was that the debate in the Council on the Water Bill had been printed and circulated. If the Parliamentary Committee gave the order, they had no authority to do so. Mr. Dickinson had no doubt the order had been given in proper form, and the printing of the speeches in the recent debate was absolutely essential to a proper understanding in the matter. Lord Welby, in reply, said the Bill was a bad one, and it would be extremely difficult to get it into shape. He trusted that, if it went into Committee, they might change chaos into order. The report, which did not contain any recommendation, was received.

The Water Companies' Views on the Bill.

The Metropolitan Water Companies issued, early last week, the following Memorandum on the subject of the Government Bill:—

The Bill is in every respect diametrically opposed to the recent report of the Royal Commission appointed by the present Government. It is framed in violation of the rights of property, and it will form a most dangerous and far-reaching precedent. Without any payment whatever, and without any agreement or award as to compensation, the Bill proposes not only suddenly to deprive the Companies of their works, but also of their cash and investments arising from undivided revenue, together with their offices and the whole of their books and papers—in short, would turn them penniless into the streets, and leave them without means and without organization to contend for adequate compensation, unless, indeed, so far as, if at all, the Local Government Board might think fit to aid them.

The provision in the Bill as to the property of which the Companies are to be summarily deprived is copied word for word from the ill-fated Government Bill of 1880, but in apparent forgetfulness that that Bill had reference to agreed terms of compensation, and reserved large

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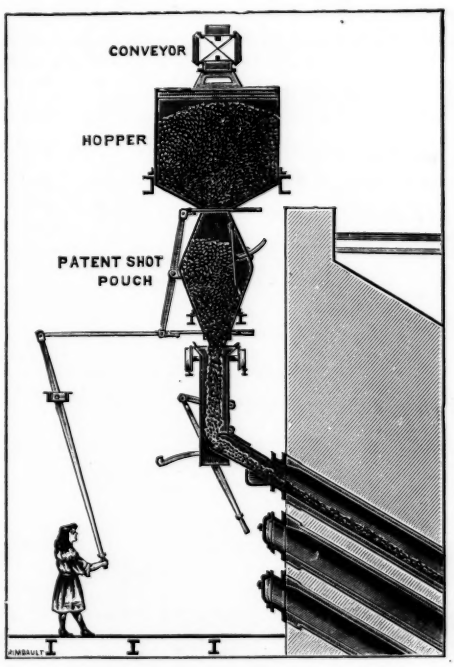

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sums to each of the Companies. The restricted power given by the Lands Clauses Act to obtain possession of land urgently required for the construction of public works has no analogy to the present case.

After having been deprived of everything, and, very possibly, several years afterwards, the Companies are to be entitled to a certain undefined amount of the proposed water stock. The amount of this stock to be awarded as compensation is left to the absolute decision of any two of the three named Arbitrators without any principle to guide them. These Arbitrators are to be absolute despots; they may with impunity refuse to receive evidence; decline to hear the parties concerned; and, in short, ignore all the principles which regulate the proceedings of arbitrators and the administration of justice. It is said that implicit reliance can be placed on the three gentlemen named in the Bill; but it is to be borne in mind that vacancies may, and probably will, occur, and it is impossible to foresee how, or by whom, such vacancies will be filled. Moreover, any two of the Arbitrators for the time being may act. But, apart from confidence in the particular Arbitrators, no Judge, however eminent, is beyond the control of the Courts of Law; and it is unconstitutional to provide that anyone should be so. No contract to this effect would be valid. Even judges have their failings, and it is not very uncommon to see the decisions of the most learned judges reversed by the House of Lords, and it occasionally happens that noble Lords in that august assembly take different views on questions of law. Every judge and every magistrate is liable to have the regularity of his proceedings questioned.

The Arbitration Act, 1889, was passed to regulate matters referred to arbitration, and to protect the parties concerned; but the Bill in express terms excludes the provisions of that Act. It is inconceivable why, because their interests are vastly important, the shareholders in the Water Companies should be deprived of the protection afforded to the humblest of His Majesty's subjects. The Lands Clauses Act, 1845, was passed to embody the provisions which had, as of course, always been inserted in Acts authorizing the compulsory purchase of property. The Preamble of the Act so states, and Mr. Cripps, K.C., M.P., in his well-known book on the Law of Compensation, says: "Uniformity in the law of compensation is of great importance;" and he refers to the care with which the Lands Clauses Acts have been drafted. The principle of compensation under the Lands Clauses Act has been the subject of well-known decisions of the Courts and of the House of Lords; and thus arbitrators and all concerned have, under it, recognized guiding principles. But the Bill ignores all this, and leaves everything to mere chance and caprice. The only excuse seems to be the suggestion that the Lands Clauses Act entitles the claimant to 10 per cent. for compulsory sale. But there is nothing whatever in the Act to this effect; and it is beyond doubt that there is no legal right to any such percentage.

The Bill is a direct attack on the rights of property, and amounts to complete confiscation. If it passes, no owner of property will hereafter be safe. The principle of the Bill will be equally applicable to new streets and new railways. Indeed, acting upon it, the Government of the day may hereafter propose to acquire one or more of the leading railway companies at a price to be fixed by an arbitrator or by arbitrators selected by the Government, and absolutely uncontrolled as to what he or they should do, or what should be awarded.

A somewhat extraordinary argument in favour of dealing unjustly with the Water Companies is that they are rich. This suggestion is based on complete misapprehension. It is needless to say that the property of the Companies is that of their individual shareholders. By far the greater number of individual shareholders hold very small amounts, and there are many trustee accounts for small amounts—in fact, there are no less than 7461 individual shareholders who hold less than £500, and there are 5454 holdings in the names of trustees. These trustee accounts are, as a rule, for the benefit of widows and children, and the individual holders are mostly those who, by thrift, have been enabled to invest hard-earned money in a security which they considered would not be destroyed by Parliament.

The Bill contemplates the possibility of the compensation being settled by agreement; but when it is borne in mind that the proposed Water Board will consist of no less than 69 members, most of whom will probably be strangers to each other and without any previous knowledge of the subject, it is obvious that arbitration, with all its consequences, is inevitable; and inasmuch as it will be to the interest of the Water Board to delay matters (for until the award they are only to pay a restricted amount in the shape of interest), it is difficult to prophesy how long the eight arbitrations may last or what they will cost. Moreover, the Bill deprives the Companies of the absolute right to the costs of the arbitration to which they are by law entitled; and thus there may be an additional motive for delay.

DEVONPORT CORPORATION AND THE WATER-WORKS.

Two Meetings in connection with the Devonport Corporation scheme for the purchase of the Water Company's undertaking were held last week. The Mercantile Association met under the presidency of Mr. W. J. Waycott, an ex-Mayor and a Director of the Gas Company. Mr. Waycott gave an account of interviews which a deputation from the Mercantile Association had had with the Town Clerk and the Solicitor to the Water Company. They were assured by the Company's Solicitor that the Directors had no intention of increasing the charges for water. From their calculations, they thought that an increase would not be necessary; the charges on the proposed new capital outlay would be met by the natural growth in the business. The Company could not, however, give a written guarantee that the price would not be increased, because they did not know what might happen. In the interview with the Town Clerk, they were given that gentleman's estimate of the sum for which the works would be acquired. The Town Clerk was reminded that four years ago the Corporation offered to take over the concern on a basis which would work out to about £350,000, to which he replied that the offer was made in the course of friendly negotiations, with a view of obtaining the undertaking

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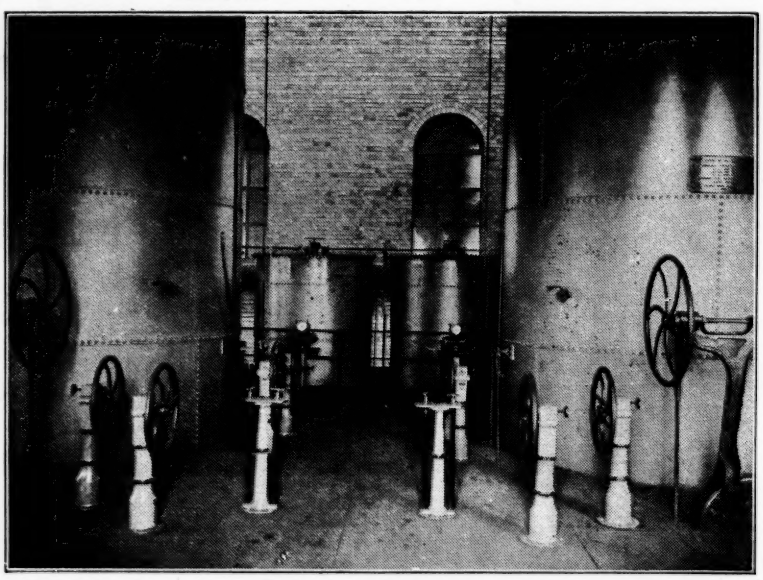

RESULTS PROVE EFFICIENCY.

Working Floor of Generator House. One-Fifth Section of Birmingham Plant, Windsor Street Station.
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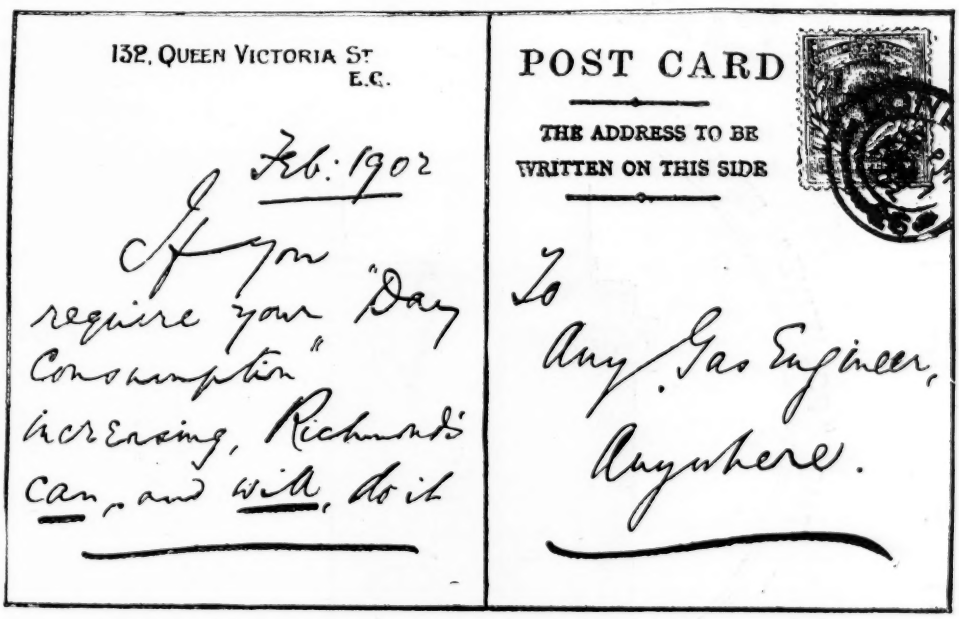
on amicable lines; but they did not now anticipate paying anything like that sum. The Town Clerk added that he thought if the Corporation acquired the water-works the income would meet the whole of the charges. If it should not, he did not think the deficit would be anything like a 2d. rate. In the course of the discussion which followed this statement, Mr. W. H. Crang contended that the experience of the Corporation in acquiring the gas-works was not such as to justify confidence in the present scheme. In addition to the £110,000, the valuation placed on the gas-works by the Arbitrators, they had to pay £39,000 for overdraft at the bank and £15,000 mortgage debt, which brought the cost of the undertaking up to £164,000. For the next forty years, the gas would cost something like a 4d. rate. Mr. F. Charlick also opposed the scheme. He believed the town would have to pay 35 years' purchase for the water-works; but if they took it at 30 years, and the net income at £10,000, the cost would be £300,000, to which should be added £100,000 for new works and £10,000 for parliamentary expenses. The interest and sinking fund on this sum would be £15,300 a year; and the difference between this and the net income of £10,000 would be a 5d. rate. Mr. H. Whitfeld, supporting the proposed purchase, said that, as to the debts of the Gas Company, which the Corporation had to take over, the fact was that the overdraft at the bank was represented by new mains and stores of good value for the money. His opinion was that the gas-works would in a few years yield £5000 or £6000 in relief of rates, and that the water-works would also prove a source of profit. They made an offer of £350,000 to the Company four years ago, in order to tempt them to sell without contention or controversy. At that time, they did not know how the Company stood; but they did now. Mr. Rundle said he was a great advocate of the purchase scheme four years ago; but at that time the income was only £4000 or £5000. It was now £10,000; and the cost would be prohibitive. The case of the water-works differed from that of the gas-works. The water was the best in the kingdom; while the gas-works were badly managed, the gas was of poor quality, and the accounts were not properly kept. The Chairman said that, as far as the gas-works were concerned, the town had made a good bargain. The effect of the transfer was to show that, while Parliament was prepared to see that the shareholders did not lose their money, it was not prepared to allocate them an unreasonable amount because they had to clear out. A resolution in support of the purchase was carried with only one dissentient.

At the statutory meeting of ratepayers on the following evening, the arguments were again gone over at great length. The Mayor, who presided, contended that the longer they deferred the purchase, the worse it would be for the town. At present, the works would cost comparatively little, because there was no storage reservoir; while if the Company secured their Bill and made a reservoir, the value would be greatly increased. Mr. W. Hawkes, who was one of the opponents of the purchase, said that he supported the acquisition of the gas-works by the town; but the case of the water-works was different. The quality of the water was beyond dispute, the management of the Company was of the most efficient character, and the charges were reasonable. They had better let well alone. The estimates for the purchase ranged from £270,000 to £900,000. The matter was one between the Corporation and the ratepayers; and he was on the side of the ratepayers. Mr. W. Garstang pointed out, as a matter for consideration in relation to the value of the undertaking, that the Company had a claim for back-dividends, and expressed the opinion that the cost would not be less than £350,000, which meant that there would be a deficit of £3000 per annum, or a 3d. rate. Then there would be the outlay for a storage reservoir and the piping of the leat. Mr. H. Banbury ridiculed the idea that they would get the works for £270,000, after having offered £350,000 four years ago. If they postponed purchase for 13½ years, according to the rate at which the value had dropped during the last four years they would get the works for nothing. The Town Clerk, replying to the speakers who contended that there would be a large deficit and a heavy rate, said the question of what the rate was going to be depended upon the purchase-price. He declined to give his opinion upon that question, because the Water Company would at once make that the minimum price, and on the top of it would put their own maximum. He believed that if they lost this opportunity of purchasing the water-works, they would do a grievous injustice to themseves. A number of other speeches were made, both for and against. In the end, a resolution in favour of the purchase was carried by a large majority; but a poll was demanded.

SEVENOAKS WATER PURCHASE QUESTION.

The Sevenoaks Water Company having declined the offer of £86,610 made by the Urban District Council for the purchase of their undertaking, it was resolved (*ante*, p. 436) that the question of the advisability of proceeding to arbitration should be referred to a meeting of the whole Council in Committee. The Committee, by a majority, have since recommended the Council to take no further steps to acquire the works under the Arbitration Clause in the Company's Provisional Order of 1900. They stated that if they went to arbitration it was impossible to predict with any certainty what the award might be; but, judging from precedents, it would probably not be less than the above offer, with, of course, all the expenses and costs incidental to arbitration, which would have to be paid by the Council. The award might be considerably more than this. The price named by the Company was £146,000; and, taking the mean between this figure and the Council's offer, the sum of £115,800 was arrived at. Putting the estimated cost of arbitration at £4200, this gave a total of £120,000, to borrow which, at 3½ per cent., would mean an annual repayment of principal and interest of £5116 for fifty years, whereas the present annual net revenue of the Company was only £2887. There would thus be an annual deficiency of £2229, and, further, there would be the possibility, not to say the probability, that the ratepayers might be called upon to provide an increased, if not an entirely fresh, supply of water to meet the growing requirements of the town and district. On the report of the Committee coming up for discussion at the last

HOW TO USE A POST CARD.



A correspondent of "The Times" having been struck by the fact that post cards now bear the legend

"The address to be written on this side,"

instead of

"The address only to be written on this side,"

has communicated on the subject with the General Post Office, and has received the following reply:—

Any writing or printing on the address side of a postal packet should be confined to the left-hand half, the right-hand half being reserved exclusively for the address and postage stamps."

The above specimen post card shows how this concession can be utilized.

meeting of the Council, Dr. Marriott said he could not vote for it, as he had opposed it in Committee. He did not think they were justified in adopting the high figures given by the Chairman. He pointed out that they had up to July 30 next year in which to come to close quarters with the Company; and he moved, as an amendment, that after the words "no further steps" should be inserted the words "in the meantime." Mr. Outram seconded the amendment. Mr. Crosbie-Hill thought they could with safety close the door now The Chairman said it would be madness to commit themselves to arbitration, which would mean that they would be bound to take over the concern at whatever price was fixed. The Committee's report was then carried; Mr. Outram, a shareholder of the Company, not voting, and Dr. Marriott voting against it.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

At the meeting of the Edinburgh and Leith Gas Commissioners this week, there was considerable discussion in regard to a minute of the Works Committee, which showed that the Committee had considered a letter from the Station Manager of the Leith works—Mr. A. W. Walker—and a relative report by the Chief Engineer; that, after consideration of the letter and report, the Committee agreed to report to the Commissioners that they were satisfied Mr. Walker had no ground for complaint, and that no further action should be taken in the matter; and that a motion by Bailie Kinnaird that Mr. Walker should be supplied with a copy of Mr. Herring's report was lost. When the minute came before the Commissioners, Bailie Kinnaird again moved that Mr. Walker should be supplied with a copy of Mr. Herring's report. Mr. Maxton, in moving approval, remarked that if they sent a copy of the report to Mr. Walker, they were simply opening up the matter again. The minute was approved by 15 votes to 3. As the Commissioners seemed desirous not to make the matter public, I do not go further into it, except to say that it originated in a simple difference of opinion.

Bailie Kinnaird raised a discussion on the Commissioners' replies to the communication of the General Assembly of the Church of Scotland in regard to Sunday labour. There were, he said, a number of elders and leaders in the Church among the Commissioners who were afraid to let the public know that they employed men in the gas-works from six o'clock in the morning till ten o'clock at night every Sunday without a break, except half-an-hour for a bite, sitting on a barrow. That was sixteen hours. It was pointed out that the same men were not employed every Sunday, and that although on duty sixteen hours, they only worked eight.

The Edinburgh and Leith Gas Commissioners are being sued by a firm of Contractors for their new gas-works at Granton. The action is a sort of *omnium gatherum*—as if the pursuers had cast about to try to discover where they could get something to claim upon. Another action has been brought by Mr. Alex. Forbes, jun., of Edinburgh, the gentleman who not long ago sued Mr. H. H. Gracie, the Resident Engineer, for alleged slander. Mr. Forbes was a co-Contractor with Messrs. Wigmore for the building; and I understand the difficulties of the Commissioners have arisen out of the two Contractors not pulling well together. The position of the Commissioners, when both cases are on, will be that they will have to stand between two fires; and it will require careful handling of legal forms, on their part, if they are to successfully maintain their defences. Messrs. Wigmore's case has been sent to proof, which should make it easy for the Commissioners, if they are not able to entirely ward off the claims, to reduce them materially; and it must be kept in view that they do not take up the position of absolute non-liability—a circumstance which should tell very much in their favour in the matter of expenses.

The proprietors of the Kitson incandescent oil-lamp are greatly displeased at the resolution of the Watching and Lighting Committee of the Aberdeen Town Council to recommend that the oil-lamps should be discontinued, and electric lamps substituted, in Union Street. They have communicated with the Town Council, and have written letters to the local newspapers, upon the subject. They point out that they can reduce the cost of an installation of eighteen lamps from £278, the sum estimated by the Lighting Inspector, to £232—from £15 9s. to £12 17s. per lamp per annum. They also contend that, light for light, their lamp is cheaper than either the electric arc or incandescent gas lighting.*

Mr. A. C. Young, Manager to the Arbroath Gas Corporation, has recently reported to that body in the following terms: "I have informed myself, as far as possible, as to the state of the manufacturing plant in the works, together with its distribution into the trunk mains outside the works. I do not feel justified at the present time in making any statement as to the plant dealing with the gas after it leaves the retort-house, unless it be to mention that there has been difficulty with the tower scrubber for dealing with the ammonia present in the gas at this point. Several of the liquor-pumps were out of action; but, having now been repaired and set to work, a better result is being obtained, although the finished gas is not yet free of ammonia, and it may be desirable to add to the present scrubbers a rotary washer-scrubber, in order to deal efficiently with this bye-product. I may say that, besides the loss of revenue incurred by permitting ammonia to escape with the gas into the holders, this impurity has a deleterious effect upon the brasswork of meters and other fittings. While reserving a further statement upon the various parts of the works till a future time as occasion may arise, I cannot bring too strongly before you the necessity of immediate action with regard to the plant inside. About thirty retorts fall to be renewed this season; and these require from four to five months to manufacture. The arches of the existing ovens, into which these are to be built, are much worn out, and several must be rebuilt

* A communication from the Company appears at the end of our correspondent's "Notes."—ED. J.G.L.

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this year. A complete bench, ironwork and all, was erected about two years ago; but you require in all from 60 to 70 retorts for the winter's work, if fired upon the existing principle. While considering the rebuilding of these arches and renewals of retorts, I am strongly of opinion that you should take advantage of the regenerator system of firing, the benefits of which you lose under existing conditions. . . . There is no apparatus at present in the retort-house for maintaining a liquor seal in the hydraulic main; and the gas is now being washed in heavy hot tar. This should not be permitted. I am satisfied the first cost of a complete bench of gaseous-fired ovens would be repaid in a few years by the economies resulting therefrom. Your attention to the retort-house is imperative if new plant is to be put down to be of service for next winter." Mr. Young also reported that, in his opinion, they should reduce the quantity of gas supplied by prepayment meters from 19 to 17 cubic feet for a penny. In his opinion, in order to meet the extra cost of working those meters, the price of gas supplied through them should be 6d. per 1000 cubic feet higher than with ordinary meters. Mr. Young was asked to submit estimates of cost for the work which he considers necessary in the retort-house.

It is frequently remarked that corporations make bad masters for gas managers; and I daresay this will be the feeling which is uppermost in the minds of many who are cognizant of the state of matters in connection with the Corporation gas undertaking of Dundee. I mentioned last week that the Gas Committee of the Corporation were to consider certain matters this week. They did so on Wednesday, and long accounts were published next day by both the Dundee newspapers. Such a subject is not to my taste, and therefore I prefer to give the account of the meeting which appeared in the "Dundee Courier" to any report which I might myself prepare. It will be observed that the tone of the report leans somewhat to the side of hostility towards Mr. M'Crae. That is unfair, because, as I have said before, Mr. M'Crae has never had a fair opportunity of showing what he can do. In the matter of the reconstruction of the works, he has been obliged to carry out other people's ideas; and in the daily work of his office, he has a gentleman who holds a position independent of him sitting on his flank. The report given by the "Dundee Courier" is as follows: "The principal subjects dealt with by the Committee were the overtime question, which has been causing much feeling in labour circles in the city, and also the large increase in the gas expenditure. The overtime question created much talk. It was admitted that for some time past overtime to a very large extent had been going on. In fact, from the last pay-sheet, it was brought out that nearly 100 men had been working from 70 to 91½ hours per week. It was stated that many of the workers participating were tradesmen. The Manager (Mr. William M'Crae) explained that the overtime could not possibly be averted, as frequently, when the shifts were changing, the relief men failed to put in an appearance, and the consequence was that the men had to continue work. A member of the Committee thought that the Manager should not tolerate such conduct, when the men failed to put in an appearance, and, should he have had sufficient cause to dismiss them, he should have done so. In reply to this, the Manager pointed out that it was difficult to get workmen who were capable of attending to the duties. The feeling of the Committee was that this system of working overtime should be discountenanced as much as possible. The matter is still engaging the attention of the sub-Committee. A more important subject which engaged the attention of the members was the large expenditure that was being incurred in connection with the gas-works. It was mentioned that the work of reconstruction up to the present had amounted to over £80,000, and that probably, before the scheme was completed, a sum of £110,000 would be entailed. The matter which gave most anxiety to the Committee was that, whereas it was estimated that, with the new apparatus in operation, and fewer men working, there would be a saving of £6000 in the wages bill, the present state of matters indicated that there would be no such large saving. The Manager was asked to explain why, with the new apparatus introduced for the purpose of saving labour, there should be an increase in the number of men employed. During the past month, it was stated there were sixteen more men employed, as against the corresponding month of last year. The Manager stated, in regard to the men engaged in the actual manufacture of gas, the decrease was considerable—the numbers being 138, as against 201; but it was the production of coke in large quantities which had increased the number of workmen. In explanation of the state of affairs at the gas-works, the Manager and the Analyst, Mr. Donald, disagreed over the carbonizing of the coal. The former held that the reduction in the quantity of gas given off was due to the bad coal; while the Analyst contended that such was not the case, but that, in his opinion, the retorts had been badly set, and were the cause of the deficiency in the quantity of gas. He (the Analyst) further pointed out that, in consequence of the bad setting of the retort-benches, the heat was not properly distributed, and the full quantity of gas not taken off. This, it was stated, was responsible for the alleged smoke nuisance that had been complained of. The Manager was asked if he could account for the falling off in the quantity of gas produced. It was stated that hitherto they were able to produce 10,500 cubic feet from a ton of coal, but it had been allowed to drop to 8500 cubic feet per ton. This falling off had given the ratepayers only an 18-candle power light, whereas they ought to have received a 24-candle power light. The Manager again blamed the coal; and it was also stated, in extenuation, that it was quite possible that coal, after long storage, might depreciate. The analyst was asked his opinion with regard to the falling off in the quantity of gas, and said from his experience, and from the same coal, he could produce 10,200 to 10,500 cubic feet per ton. He further remarked that the coal which was being used was highly satisfactory, and that good results ought to be obtained. The outcome of the discussion was that the Manager was instructed to bring up a report showing the details of the wages paid to the workmen and the general expenditure in the various departments, and a contrast with the same details of expenditure for last year."

The Larkhall Gas Company have paid a dividend for the past year of 5 per cent., and have reduced the price of gas from 3s. 9d. to 3s. 4d. per 1000 cubic feet. The Douglas (Lanarkshire) Gaslight Company

have paid a dividend of £2 5s. per share, and added £500 to the reserve fund.

The Brechin Gaslight Company have, in response to a representation from consumers, agreed to reduce the price of gas 6d. per 1000 cubic feet to all users of gas engines and cookers.

The Glasgow and South-Western Railway Company have introduced, at Ayr, an installation of Pintsch's oil-gas manufacturing plant for the production of gas for lighting the carriages running in the district. The works are situated near Newton-on-Ayr Station, and have a productive capacity of 42,000 cubic feet of gas per day. There are eight manufacturing furnaces, and the six high-pressure gasholders have a capacity of 70,000 cubic feet. The carriages are charged with the gas at a pressure of 150 lbs. per square inch.

Referring to our correspondent's remarks last week on the subject of the experiments made by the Corporation of Aberdeen with Kitson lamps, the Kitson Lighting Company write as follows: "Your correspondent gives the results of the recent test made in Aberdeen with the Kitson lamps, and makes a comparison between the Kitson system, electric arc lighting, and incandescent gas. He says: 'Having demonstrated that gas lighting is the cheapest, it is their [the Council's] duty, if they desire uniformity, to adopt it all along.' Your correspondent's omission to state the candle power supplied by the three systems renders his conclusions fallacious. The fact that the 69 incandescent gas-lamps which were displaced by 18 Kitson lamps consumed only 3 cubic feet per burner, and gave certainly not more than 60-candle power per burner. We believe we are overstating it when we say that the whole 69 incandescent gas-lamps did not give more than 4000-candle power. The 18 arc lamps would furnish a light, with the opalescent globe (which is necessary for obtaining the requisite diffusion), of certainly not more than 600-candle power each. The 18 Kitson lamps furnish a candle power of 1000, as per Professor Lewes's tests made about a year ago. The results of the Aberdeen trials are therefore as follows: 18 electric arc lamps, giving a total of 10,800-candle power, cost £358 4s. 3d. per annum for 3438 hours' burning; 69 incandescent gas-lamps, giving a total of 4000-candle power, for the same number of hours, cost £133 5s. 9d. per annum; and 18 Kitson lamps, giving a total of 18,000 candle power for the same number of hours, cost £278 5s. a year Reducing these all to the cost of 1000 candle power per hour, we have the following results: Electric arc lamp, 2·31d.; incandescent gas-lamp, 2·25d.; and Kitson lamp, 1·08d. It is therefore to be seen that the Kitson lamp is less than half the cost of the other systems. But this is not all. The test of the Kitson lamp was made during the severest weather, when the consumption of oil and mantles and globes is far greater than it would be in more moderate weather. The cost of the material also entering into the operation of the Kitson lamps is higher than it would be if run on one or more years' contract. We have written to the Aberdeen Council to say that we can guarantee to supply oil, mantles, and globes at a considerably reduced cost, which will bring the total cost of running the Kitson lamp on the above schedule to less than £13 per annum, which would reduce the cost of operating the light to 0·8d. for 1000-candle power per hour. We have the statements from several of our customers that they are working our lamps at as low as 0·7d. for 1000-candle power. This price includes oil, mantles, labour, maintenance, breakage of globes, and everything except interest on the investment."

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *March* 1.

Sulphate of Ammonia.

Notwithstanding the seasonable weather, the market has been quiet throughout the week. There has been more reselling, especially in Scotland, and makers' quotations have been dropped to £11 7s. 6d. per ton, f.o.b. Leith. The quotations f.o.b. Hull and Liverpool, however, remain £11 7s. 6d. and £11 10s. per ton, respectively. Consumers abroad have been endeavouring to get in at a decline; but they have not met with much success—the very heavy shipments during the month having depleted stocks, and the moderate quantity offered having found a market at last week's currencies, except in Scotland, where reselling has had a damaging effect. In the forward position, makers' attitude is unchanged, although there has been speculative selling abroad at a discount on their prices. Whether the latter is really a "bear" movement, or only an effort to shake the confidence of makers, is not yet apparent.

Nitrate of Soda.

This is very strong; and quotations on the Continent have been advanced fully 3d. per cwt. On spot the quotation remains at 10s. 4½d. per cwt. for fine quality.

LONDON, *March* 1.

Tar Products.

There is not much business doing generally; but there is a very strong inquiry for pitch, for both early and forward delivery. There is, however, nothing offering in London for delivery before October; and distillers do not care to sell except up to the end of March, 1903. Benzol is very dull. There is an entire absence of business for prompt delivery—consumers not caring to purchase, except at very low figures. In carbolic acid, business has been done at 1s. 11d. for 60's up to the end of June; and in some instances makers ask 2s. for early delivery. Crystals are very quiet; the only demand being for 34-35's. Creosote is easier all round, especially in the North, where there are several sellers for early delivery. There is no demand for solvent naphtha; and very low quotations are reported at outports. Toluol is entirely neglected; and there is no business doing in the article.

The average values obtaining during the week are: Tar, 16s. to 19s.; Pitch, east coast, 37s. 6d. to 38s. 6d.; London, 39s. 6d. to 40s; west coast, 35s. to 36s. Benzol, 90's, 9d.; 50's, 8d. Toluol, 9d. to 9⅛d. Crude naphtha, 3½d.; solvent naphtha, 10d. to 11d.; heavy naphtha,

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Sulphate of Ammonia.

The market is quiet; the general tone is weaker. Beckton price is unaltered; but there are no buyers at same—consumers expecting lower prices in June. In Leith, business has been done at £11 7s. 6d. prompt shipment. In Hull, further sales are reported at £11 7s. 6d.; but there is not a very strong demand at this price. In Liverpool, prices are easier, and there is not much business to report for either prompt or forward delivery.

COAL TRADE REPORTS.

Lancashire Coal Trade.

Except such lessened pressure as the milder weather has caused in some classes of fuel, no very material change can be reported as regards the position of trade generally throughout this district. The better qualities suitable for house-fire purposes are still in fairly good demand, and pits are able to move off all they are raising, with prices strong at late rates, and no alteration in quotations with the commencement of the month—best Wigan Arley averaging 15s. to 15s. 6d. per ton at the pit, Pemberton four feet and seconds Arley 13s. to 13s. 6d., and common house coal 11s. to 11s. 6d. The lower qualities of round coal are rather more plentiful, as these are readily affected by weather conditions; and prices are perhaps not quite so firm as they have been, although no really quoted reduction has taken place. For steam and forge purposes, the demand continues ample, with 9s. still about the average figure for good qualities at the pit, although perhaps a trifle under this might in some cases be accepted on special sales. The better descriptions of engine fuel still meet with a ready sale; and prices are being well maintained at recent quotations, averaging, for Lancashire slack, about 6s. 6d. for good medium sorts and 7s. for best qualities. Of the inferior descriptions, there are ample supplies; and a good deal of surplus from outside districts, chiefly Derbyshire and Nottinghamshire, is pushed for sale in local markets at low figures. This necessarily tends to weaken Lancashire prices, which do not average more than 5s. to 5s. 6d. per ton at the pit for the commoner sorts of slack. Shipping inquiries have fallen off; and prices are easier, averaging about 10s. 6d. for good ordinary steam coals, delivered at the ports on the Mersey. For coke, there is a continued steady inquiry, with prices well maintained at recent quotations.

Northern Coal Trade.

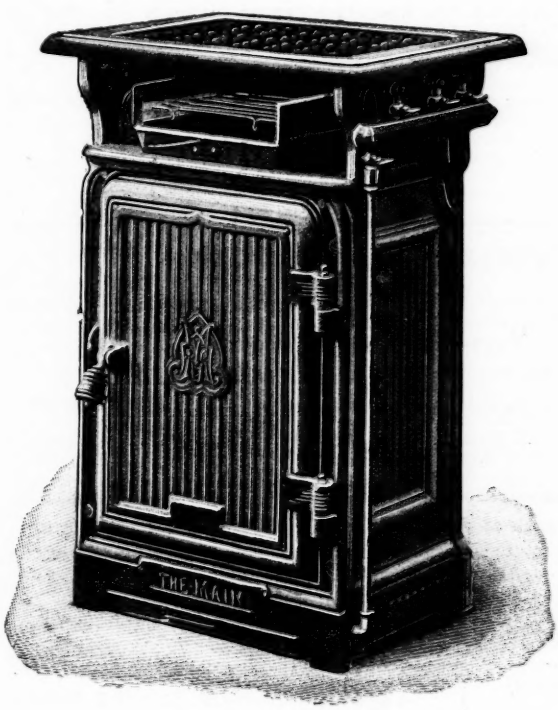
The giving out of a large number of contracts for fuel for shipment over the season has tended to settle the coal trade of the North, and to define values better. In steam coals, best Northumbrian qualities are from 10s. 9d. to 11s. per ton f.o.b., unscreened steams are weak, and steam smalls vary from 4s. 6d. to 5s. Collieries are still working short time; so that some have made concessions in price to obtain prompt orders. Manufacturing coals are unaltered; and there is little change in household coals, though markets seem duller. Large contracts for coal for Sweden have been closed at about 16s. per ton at Stockholm, which includes freight, &c., and tax. In the gas coal trade, the demand shows a reduction. For Durham gas coals, the price quoted varies from 9s. to 10s. per ton f.o.b., according to quality. In the way of contracts, not so much has been done of late; but it is believed that some contracts have been entered into for export at about 9s. per ton f.o.b. For coke, the demand is better, and prices are steadier. Best Durham coke for export is now 17s. to 17s. 6d. per ton f.o.b. Blast-furnace coke is 14s. 9d. to 15s. per ton at the Teesside furnaces. Gas coke is rather steadier, at from 9s. 6d. to 10s. per ton f.o.b.; the output being now a little less.

Scotch Coal Trade.

There is little movement one way or another. If anything, prices have still a tendency to droop; the foreign market being weak, with no great prospect of its improving. The prices quoted are: Main 9s. to 9s. 3d. per ton f.o.b. Glasgow, ell 9s. 9d. to 10s. 9d., and splint 10s. 6d. to 10s. 9d. The shipments for the week amounted to 174,033 tons—a decrease of 7607 tons upon the previous week, but an increase of 29,500 tons upon the corresponding week of last year. For the year to date, the total shipments have been 1,282,923 tons—an increase of 118,337 tons upon the same period of the previous year.

Attempted Suicide by Coal Gas.—At the Kent Winter Assizes, before Mr. Justice Wright, Constantin Schiller, 25, a footman, pleaded guilty to attempting to commit suicide, at Margate, on the 23rd of January. Mr. Sankey prosecuted, and said prisoner tried to suffocate himself with gas. His Lordship bound the prisoner over to come up for judgment if called upon.

Sales of Shares.—At the Mart, Tokenhouse Yard, E.C., last Tuesday, Mr. Alfred Richards sold, by order of the Directors, a new issue of ordinary £10 shares in the Lowestoft Water and Gas Company, ranking for a maximum dividend of 7 per cent. (last dividend 5¼ per cent.), at prices ranging from £10 10s. to £12 5s.; also some 4 per cent. perpetual debenture stock at from £106 to £108 per cent. An issue of £10,000 of ordinary "C" stock of the Wandsworth and Putney Gas Company (present dividend 5¼ per cent.) fetched prices ranging from £101 to £120 10s. per £100 of stock. The last item in the particulars was an issue of 400 ordinary £5 shares, carrying a dividend at the rate of 7 per cent. per annum from the 31st inst., in the Pinner Gas Company; and 20 of them were sold for £5 15s. each, and the rest for £5 10s. On the same day, Messrs. Alfred Mansell and Co., of Shrewsbury, offered for sale £825 of the Shrewsbury Gas Company's converted ordinary stock in eight lots. The bidding started at £105, and went up to £111, when the parcel was withdrawn; but it was afterwards sold in the room privately.



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Sale of the Narberth Gas-Works.—An extraordinary general meeting of the Narberth Gas Company, Limited, was held on the 24th ult., when it was resolved to voluntarily wind up the Company, and sell the undertaking to Mr. J. H. Silcox, who was for 27 years Manager of the Pembroke Dock Gas-Works.

Rhymney in Darkness.—The accidental pushing down of the wrong valve of one of the gasholders, was responsible for considerable inconvenience at Rhymney and Pontlottyn last Sunday week. The light went out suddenly at about half-past six; and no gas was procurable for three quarters of an hour. In the meantime, candles, lamps, &c., had to be hastily requisitioned, in order that the services in the various places of worship might be proceeded with.

The Thirlmere Scheme—The work in connection with the new aqueduct to connect Thirlmere with Manchester is being pushed on as rapidly as possible. Already the contract has been let for the completion of the southern section, stretching from Longridge to a point seven miles north of Preston. The Water Committee of the Corporation have issued advertisements for contracts to complete the northern section, extending from the end of the southern section to a point near Ambleside.

Knutsford Water Supply.—It is announced that, after more than four years of boring, during which great difficulties have been encountered and overcome, the firm of engineers commissioned by the Knutsford Light and Water Company have at last come upon a supply of water which expert opinion says will turn out good. A depth of nearly 1800 feet has been reached; and the work of boring has cost considerably more than £6000. The water discovered is of a somewhat brackish character; but when the borehole is tubed properly, this defect is expected to disappear.

Maidstone Gas Company and the Council.—A short time since, a dispute arose between the Maidstone Gas Company and the Urban District Council with regard to the price to be charged by the former for the cleaning, lighting, &c., of the public lamps. When the municipal electric lighting installation came into operation last December, the Council dispensed with 114 of the gas-lamps in the compulsory area; and the Company very naturally contended that it would cost more proportionately for the upkeep of the smaller number remaining. At the last meeting of the Council, it was stated that the Chairman of the Gas Company (Mr. George Marsham), in order to avoid any friction, had expressed his willingness to advise the Directors to split the difference; and it was agreed that this offer should be accepted. The Company's charge for lighting and extinguishing will therefore be raised by about 9d. per lamp.

Manchester Water Supply.—At a meeting of the Manchester Water Committee last Thursday, it was stated that the difficulties with regard to laying a second service-pipe from Thirlmere had been overcome. The contracts are divided over two sections, which are, roughly speaking, from Prestwich to Longridge, which is 7 miles north of Preston, and from this point onwards to a spot near Ambleside. These are known as the southern and northern portions respectively. The contracts for the southern portion have been let, and the work will shortly begin; and those for the northern portion will be advertised forthwith. It was also stated that experiments are to be made on the use of steel pipes for carrying the water across bridges and under subways, in place of cast-iron pipes. The steel pipe is very light and tough, and varies from 40 to 44 inches in diameter; but as it is only $\frac{5}{8}$ to $\frac{11}{16}$ inch in thickness, the Committee are sceptical as to its use underground, in view of the inevitable corrosion.

An application by the Blackpool Corporation for power to borrow £10,000 for gas-works purposes was recently the subject of an inquiry by Colonel W. R. Slacke, R.E., one of the Inspectors of the Local Government Board. The Gas Engineer (Mr. J. Chew) explained the details of the proposed improvements. There was no opposition.

Messrs. Jonas Drake and Son have lately secured a contract from the Ossett Corporation for three through beds of eight retorts, on their patent tube regenerator principle, together with a chimney and all the necessary ironwork required.

Messrs. F. C. Sugden and Co., of Leeds, have received orders for regenerator settings from the Hampton Court, Yeadon and Guiseley, and Whitworth Vale Gas Companies. These are all repeat orders, and are for deep, semi-deep, and shallow regenerator settings.

On Thursday, the 20th ult., Mr. Joseph Greenwood, who has taken a prominent part in the public affairs of Sowerby Bridge for many years, entertained the employees of the Sowerby Bridge and Luddenden Foot Gas-Works to tea, in celebration of the 80th anniversary of his birthday. The meal was served in the mess-room at the Sowerby Bridge works; and a hearty vote of thanks was accorded to Mr Greenwood for providing it.

The prominence lately given in our columns to the subject of the maintenance of incandescent gas-lights is bringing forth evidence that the practice is more general than might have been supposed. The advantages of the system have been for some little time presented to the customers of the Shrewsbury Gas Company in a concise and convincing form by Mr. W. Belton, the Engineer and Secretary, who has issued a neat little leaflet setting forth what the Company will and what they will not undertake, and the rates they charge, which range from 10d. down to 7d. per burner per quarter, according to number.

According to the report of the Directors of John Wright and Eagle Range, Limited, which will be presented at the general meeting of shareholders in Birmingham next Friday, the profit for the past year, after strengthening the internal reserves and charging Directors' fees, Managing Directors' remuneration, and depreciation on the buildings and plant, amounts to £45,586. After adding the balance of £6569 brought forward, and deducting the interim dividends (£12,762) paid last August, there remains at disposal the sum of £39,393, which the Directors recommend, should be appropriated as follows: Dividend at the rate of 6 per cent. per annum for the half year on the preference shares (less income-tax), £2401; dividend of 2s. 6d. per share on the ordinary shares (free of income-tax), £17,250; to the reserve (raising the fund to £35,000), £10,000; leaving £9742 to be carried forward to next year.

The balance-sheet of the Richmond Stove and Meter Company, Limited, for the year ending Dec. 31, reached the shareholders on Saturday. It shows that the balance to the credit of profit and loss account on Dec. 31 (after deducting the debenture interest, and the Managing Director's and Managers' commissions, including £3439 brought forward, is £18,951. The Directors propose a dividend on the preference shares at the rate of 6 per cent. per annum (£4662) and on the ordinary shares at the rate of 10 per cent. per annum (£6507) Shares and cash to the amount of £2000 are to be allocated to the employees' profit-sharing fund; and £2824 written off as depreciation from buildings, patterns, plant, and show-room fixtures. This will absorb £15,993; and the balance (£2958) is to be carried forward to the current year's trading. In their review of the year, the Directors allude to the acquisition of the business of Messrs. George Glover and Co., Limited, and of Messrs. W. & C. Staples, automatic meter attachment makers, and state that their profits show a satisfactory return on the cash paid and shares allotted. Reference is also made to the reduction in prices by 7½ per cent., which came into effect twelve months ago. This, it is stated, has considerably reduced the net profits of the Company, although the gross sales show a satisfactory increase. The cause of this is not far to seek. At the time of the general reduction in prices, the Richmond Company had to run out their contracts for raw materials; and, as a consequence, were paying higher prices for iron, and receiving a reduced price from the gas companies for the made-up article. Reference is made to the profit-sharing scheme, which continues to produce satisfactory results, and has encouraged various employees to subscribe for 5082 £1 ordinary shares at 1s. premium, which they are to retain for five years.

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